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TM 9-1808B
1943

TM 9-1808B

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WAR DEPARTMENT

[US Army Dept.]

TECHNICAL MANUAL

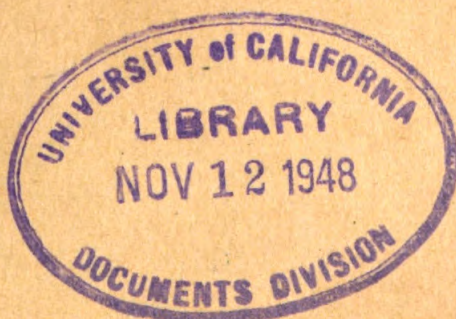


ORDNANCE MAINTENANCE

**POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4
AND $1\frac{1}{2}$ TON 6 x 6 (DODGE)**

17 NOVEMBER 1943

***Dissemination of restricted matter. — The information contained in restricted documents and the essential characteristics of restricted materiel may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also paragraph 18b, AR 380-5, 28 September 1942.)**



RESTRICTED

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No. 9-1808B

WAR DEPARTMENT
Washington, 17 November 1943

ORDNANCE MAINTENANCE

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VEHICLES — $\frac{3}{4}$ TON 4 X 4 AND
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**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, and 1½ TON 6 x 6 (DODGE)**

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CHAPTER 1

INTRODUCTION

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Purpose and scope	1
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1. PURPOSE AND SCOPE.

a. The instructions contained in this manual are for the information and guidance of personnel charged with the maintenance and repair of Dodge 1½ ton, 6 x 6 and ¾ ton, 4 x 4 trucks. Information on the detailed construction of the unit, disassembly and assembly procedure, inspection, maintenance and repair is contained in two Technical Manuals of the 1000 series, of which this is the manual on the power train, chassis and body. These instructions are supplementary to those in the Field and Technical Manuals prepared for the using arms. This manual does not contain information which is intended primarily for the using arms, since such information is available to ordnance maintenance personnel in 100-series TM's or FM's.

b. This manual (TM 9-1808B) contains a description of, and procedure for removal, disassembly, inspection, and repair of the units of power train, chassis and body.

c. TM 9-1808A contains information, a description of, and procedure for removal, disassembly, inspection and repair of the engine and electrical units.

2. ARRANGEMENT OF MANUAL.

a. This manual is divided into five chapters as follows:

(1) Chapter 1 contains information to help identify the materiel on which maintenance information is given, general information on maintenance terms used and the maintenance allocation chart.

(2) Chapter 2 concerns the power train beginning with general description and data. Trouble shooting is treated next, followed by disassembly, inspection, repair and assembly of the power train units; the transmission, transfer case, propeller shafts, front axle, rear axles and differential and carrier assembly. A chart of fits and tolerances for the power train units completes Chapter 2.

(3) Chapter 3 concerns chassis units beginning with general description and data. Trouble shooting for chassis units is treated next, followed by disassembly, inspection, repair and assembly instructions on

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brake units, steering gear, frame, springs, shock absorbers and winch. A table of fits and tolerances for chassis units completes Chapter 3.

(4) Chapter 4 contains instructions for replacement of body parts for the various style bodies supplied on $\frac{3}{4}$ ton, 4 x 4 and 1½ ton, 6 x 6 truck chassis.

(5) Chapter 5 contains a list of tools required for servicing the units covered by this manual.

3. DISTINGUISHING CHARACTERISTICS OF MATERIEL.

a. **General.** The $\frac{3}{4}$ ton, 4 x 4 and 1½ ton, 6 x 6 Dodge trucks are manufactured in different body styles for various tactical uses. The $\frac{3}{4}$ ton, 4 x 4 trucks can be driven by all four wheels or by the rear wheels only. The 1½ ton, 6 x 6 trucks can be driven by all six wheels or by the four rear wheels only. Differences in the transfer case, propeller shafts and rear axles are explained in the respective sections of the manual.

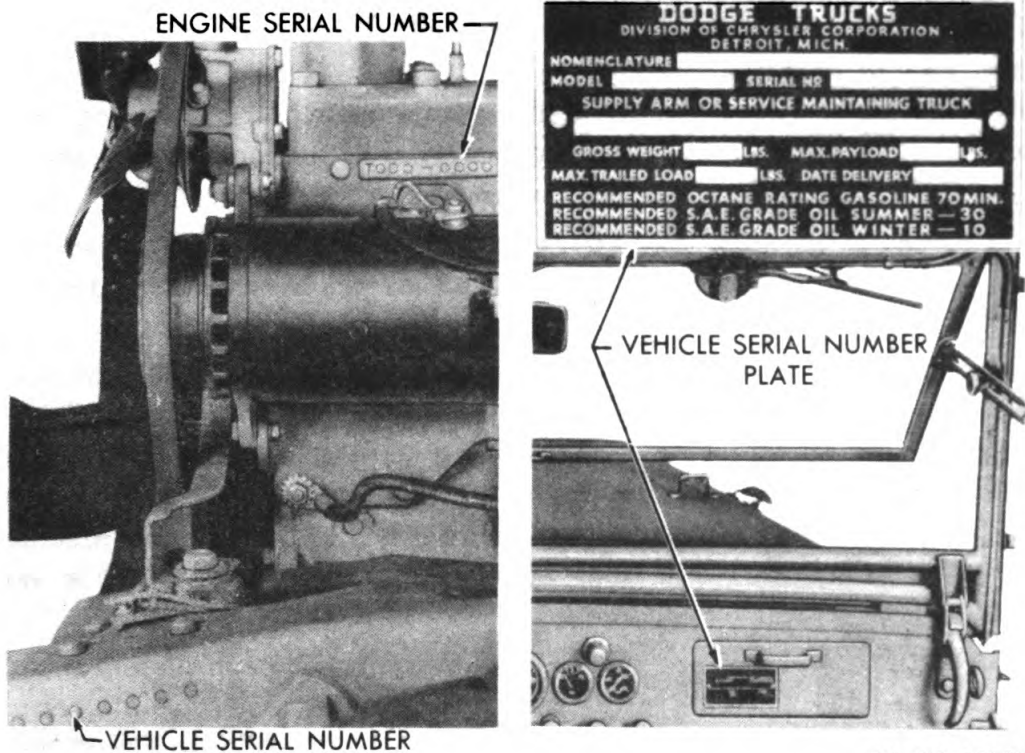
b. **Engine and Vehicle Serial Numbers** (fig. 1). The engine number is stamped on a boss on the left side of the engine block opposite number one cylinder. The letter on the circular bosses on the block are for the use of factory inspectors only and are not to be used with the engine number. The vehicle serial number is stamped on a plate which is attached to the face of the instrument panel and on the left frame side member just forward of the front axle. Engine numbers for the $\frac{3}{4}$ ton 4 x 4 trucks start with number T214-1001 and vehicle serial numbers start with number 81,534,381. Engine numbers for the 1½ ton 6 x 6 trucks start with number T223-1001 and vehicle serial numbers start with number 82,000,001.

4. MAINTENANCE ALLOCATION.

a. **Scope.** The scope of maintenance and repair by the crew and other units of the using arms is determined by the availability of suitable tools, availability of necessary parts, capabilities of the mechanics, time available, and the tactical situation. All of these are variable and no exact system of procedure can be prescribed. Many second echelon operations are often done by ordnance personnel.

b. **Allocation of Maintenance.** Indicated below are the maintenance duties for which tools and parts have been provided for the using arm personnel. Other replacements and repairs are the responsibility of ordnance maintenance personnel but may be performed by using arm personnel when circumstances permit, within the discretion of the

INTRODUCTION



RA PD 53501

Figure 1—Engine and Vehicle Serial Numbers

commander concerned. Echelons and words as used in this list of maintenance allocations are defined as follows:

**FIRST AND
SECOND ECHELON:**
Table III
AR 850-15

Operating organizations, driver, operator, or crew, companies and detachments, battalions, squadrons, regiments, and separate companies and detachments (first and second echelons, respectively).

THIRD ECHELON:
Table III
AR 850-15

Technical light and medium maintenance units, including post and port shops.

FOURTH ECHELON:
Table III
AR 850-15

Technical heavy maintenance and field depot units, including designated post and service command shops.

FIFTH ECHELON:
Table III
AR 850-15

Technical base units.

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SERVICE: Preventive maintenance, checking and replenishing fuel, oil, grease, water and anti-freeze, air, and battery liquid; checking and tightening nuts and bolts; cleaning; and making external adjustment of subassemblies or assemblies and controls.

Par. 24 a (2)
and (3) in part
AR 850-15

REPLACE: To remove an unserviceable part, assembly, or subassembly from a vehicle and replace it with a serviceable one.

Par. 24 a (5)
AR 850-15

REPAIR: To restore to a serviceable condition, such parts, assemblies or subassemblies as can be accomplished without completely disassembling the assembly or subassembly, and where heavy riveting, or precision machining, fitting, balancing, or alining is not required.

Par. 24 a (4)
in part
AR 850-15

REBUILD: Consists of stripping and completely reconditioning and placing in serviceable condition any vehicle or unserviceable part, subassembly, or assembly of the vehicle, including welding, riveting, machining, fitting, alining, balancing, assembling, and testing.

Par. 24 a (6)
AR 850-15

RECLAMATION: Salvage of serviceable or economically repairable units and parts removed from vehicles, and their return to stock. This includes the process which recovers and/or reclaims unusable articles or component parts thereof and places them in a serviceable condition.

AR 850-15
Par. 24 a (7) and
in part CIR. 75,
dated 3/16/43

NOTES: (1) Operations allocated will normally be performed in the echelon indicated by "X".

(2) *The second echelon is authorized to remove and reinstall items marked by an asterisk. However, when it is necessary to replace an item marked by an asterisk with a new or rebuilt part, subassembly, or unit assembly, the assembly marked by an asterisk may be removed from the vehicle by the second echelon *only after authority has been obtained from a higher echelon of maintenance.*

(3) Operations allocated to the third echelon as indicated by "E" may be performed by these units in emergencies only.

(4) Operations allocated to the fourth echelon by "E" are normal fifth echelon operations. They will not be performed by the fourth echelon, unless the unit is expressly authorized to do so by the chief of the service concerned.

(5) Technical Bulletins of the 2830-series should be consulted for detailed information relative to reclamation procedure.

INTRODUCTION

ABSORBERS, SHOCK	ECHELONS			
	2nd	3rd	4th	5th
Absorber assemblies, shock (w/linkage)—replace	X			
Absorber assemblies, shock (w/linkage)—repair		X		
Absorber assemblies, shock (w/linkage)—rebuild			E	X
AXLE, FRONT				
Arm, steering (knuckle)—replace		X		
*Axle assembly—replace	*	X		
Axle assembly—repair		X		
Axle assembly—rebuild			E	X
Bearings, wheel—service, adjust and/or replace	X			
Drums, brake—replace	X			
Gears, bevel and pinion—adjust		X		
Hub assemblies—replace	X			
Hub assemblies—repair		X		
Hub assemblies—rebuild			X	
Hub and drum assemblies—replace	X			
Retainers, wheel grease—replace	X			
Rod assembly, tie—replace	X			
Rod assembly, tie—repair		X		
Seals, trunnion housing oil—replace	X			
Shafts, axle—replace		X		
Wheel alignment, toe-in—adjust	X			
Wheel alignment, camber and caster—check		X		
AXLES AND SUSPENSION, REAR				
*Axle assemblies—replace	*	X		
Axle assemblies—repair		X		
Axle assemblies—rebuild			E	X
Bearings, spring seat (1½ ton, 6 x 6)—service, adjust, and/or replace	X			
Bearings, wheel—service, adjust and/or replace	X			
Drums, brake—replace	X			
Gears, bevel and pinion—adjust		X		
Hub assemblies—replace	X			
Hub assemblies—repair		X		

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	ECHELONS			
	2nd	3rd	4th	5th
AXLES AND SUSPENSION, REAR (Cont'd)				
Hub assemblies—rebuild.....			X	
Hub and drum assemblies—replace.....	X			
Retainers, wheel grease—replace.....	X			
Rod assemblies, torque (1½ ton, 6 x 6)—replace	X			
Rod assemblies, torque (1½ ton, 6 x 6)—repair		X		
Rod assemblies, torque (1½ ton, 6 x 6)—rebuild			E	X
Seat assemblies, spring (1½ ton, 6 x 6)—replace	X			
Seat assemblies, spring (1½ ton, 6 x 6)—repair		X		
Seat assemblies, spring (1½ ton, 6 x 6)—rebuild			E	X
Shaft or tube, trunnion (1½ ton, 6 x 6)—replace	X			
Shaft or tube, trunnion (1½ ton, 6 x 6)—rebuild			E	X
Shafts, axle—replace.....	X			
Spring assemblies, rear suspension—replace....	X			
Spring assemblies, rear suspension—repair.....		X		
Spring assemblies, rear suspension—rebuild....			E	X

BODY

Blades, windshield wiper—replace.....	X			
Body assembly—replace.....			X	
Body assembly—repair.....		X		
Body assembly—rebuild.....			X	
Bows and ridgepole ($\frac{3}{4}$ ton, 4 x 4 weapon carrier) —replace.....	X			
Bows and ridgepole ($\frac{3}{4}$ ton, 4 x 4 weapon carrier) —repair.....		X		
Cab assembly ($\frac{3}{4}$ ton, 4 x 4)—replace.....			X	
Cab assembly ($\frac{3}{4}$ ton, 4 x 4)—repair.....		X		
Cab assembly ($\frac{3}{4}$ ton, 4 x 4)—rebuild.....			X	
Cushions, seat ($\frac{3}{4}$ ton, 4 x 4)—replace.....	X			
Cushions, seat ($\frac{3}{4}$ ton, 4 x 4)—rebuild.....			X	
Door assemblies ($\frac{3}{4}$ ton, 4 x 4)—replace and/or repair.....		X		
Glass ($\frac{3}{4}$ ton, 4 x 4)—replace.....		X		
Seat assemblies, bucket—replace.....	X			
Seat assemblies, bucket—repair.....		X		
Seat assemblies, bucket—rebuild.....			X	
Seats, troop—replace.....	X			
Seats, troop—repair.....		X		

INTRODUCTION

ECHELONS

2nd 3rd 4th 5th

BODY (Cont'd)

Tarpaulin—replace.....	X			
Tarpaulin—repair.....			X	
Top assembly (w/curtains) ($\frac{3}{4}$ ton, 4 x 4 reconnaissance command)—replace.....		X		
Top assembly (w/curtains) ($\frac{3}{4}$ ton, 4 x 4 reconnaissance command)—repair.....			X	
Upholstering ($\frac{3}{4}$ ton, 4 x 4)—replace.....			X	
Windshield assembly—replace.....	X			
Windshield assembly—repair.....		X		
Wiper assemblies, windshield—replace.....	X			
Wiper assemblies, windshield—repair.....		X		
Wiper assemblies, windshield—rebuild.....			X	

BRAKE, PARKING

Band assembly—adjust and/or replace.....	X			
Band assembly—repair (reline).....		X		
Controls and linkage—adjust and/or replace...	X			
Controls and linkage—repair.....		X		

BRAKES, SERVICE

Controls and linkage—adjust and/or replace...	X			
Controls and linkage—repair.....		X		
Cylinder assembly, master—replace.....	X			
Cylinder assembly, master—repair.....		X		
Cylinder assembly, master—rebuild.....			X	
Cylinder assemblies, wheel—replace.....	X			
Cylinder assemblies, wheel—repair.....		X		
Cylinder assemblies, wheel—rebuild.....			X	
Hose, flexible, lines and connections—replace and/or repair.....	X			
Shoe assemblies—adjust and/or replace.....	X			
Shoe assemblies—repair (reline).....		X		

CASE, TRANSFER

*Case assembly, transfer—replace.....	*	X		
Case assembly, transfer—repair.....		X		
Case assembly, transfer—rebuild.....			E	X
Controls and linkage—adjust and/or replace...	X			

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CASE, TRANSFER (Cont'd)	ECHELONS			
	2nd	3rd	4th	5th
Controls and linkage—repair		X		
Drum, parking brake (1½ ton, 6 x 6)—replace . .	X			
CLUTCH				
Bearing, release—replace	X			
Clutch—replace and/or repair		X		
Clutch—rebuild			X	
Controls and linkage—adjust and/or replace . .	X			
Controls and linkage—repair		X		
Plate, clutch driven—replace	X			
Plate, clutch driven—repair (reline)		X		
COOLING GROUP				
Connections—replace	X			
Radiator assembly—replace	X			
Radiator assembly—repair		X		
Radiator assembly—rebuild			X	
System, cooling—service	X			
ELECTRICAL GROUP				
Battery—service (recharge) and/or replace	X			
Battery—repair		X		
Battery—rebuild			X	
Cables, battery—replace and/or repair	X			
Coil, ignition—replace	X			
Filters—replace	X			
Horn assembly—adjust and/or replace	X			
Horn assembly—repair		X		
Horn assembly—rebuild			X	
Lamp assemblies—adjust and/or replace	X			
Lamp assemblies—repair		X		
Lamp assemblies—rebuild			X	
Regulator, current and voltage—replace	X			
Regulator, current and voltage—adjust and/or repair		X		
Regulator, current and voltage—rebuild			X	
Socket assembly, trailer coupling—replace	X			
Socket assembly, trailer coupling—repair		X		
Switch assemblies—replace	X			
Switch assemblies—repair		X		
Wiring—replace and/or repair	X			

INTRODUCTION

ENGINE	ECHELONS			
	2nd	3rd	4th	5th
Bearings, connecting rod (inserts)—replace.....		E	X	
Bearings, crankshaft (inserts)—replace.....		E	X	
Belt—adjust and/or replace.....	X			
Block, cylinder—rebuild (recondition).....			E	X
Carburetor assembly—adjust and/or replace... X				
Carburetor assembly—repair.....		X		
Carburetor assembly—rebuild.....			X	
Chain, timing—replace.....		X		
Cleaner, air—service and/or replace.....	X			
Cleaner, air—repair.....		X		
Condenser, distributor—replace.....	X			
Controls and linkage—adjust and/or replace... X				
Controls and linkage—repair.....		X		
Crankshaft—rebuild (recondition).....			E	X
Distributor assembly—adjust and/or replace... X				
Distributor assembly—repair.....		X		
Distributor assembly—rebuild.....			X	
*Engine assembly—replace.....	*	X		
Engine assembly—repair.....		X		
Engine assembly—rebuild.....			E	X
Fan assembly—replace.....	X			
Fan assembly—repair.....		X		
Fan assembly—rebuild.....			X	
Filter assembly, oil—service or replace cartridge. X				
Filter assembly, oil—replace.....	X			
Filter assembly, oil—repair.....		X		
Flywheel assembly—replace and/or repair.....		X		
Flywheel assembly—rebuild (recondition).....			E	X
Gaskets, cylinder head and manifold—replace.. X				
Generator assembly—replace.....	X			
Generator assembly—repair.....		X		
Generator assembly—rebuild.....			X	
Governor assembly—adjust and/or replace.....		X		
Governor assembly—rebuild.....			X	
Head, cylinder—replace and/or repair.....		X		
Housing, flywheel—replace and/or repair.....		X		
Housing, flywheel—rebuild (recondition).....			E	X

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ENGINE (Cont'd)	ECHELONS			
	2nd	3rd	4th	5th
Lines and connections, oil (external)—replace and or repair.....	X			
Lines and connections, oil (internal)—replace and or repair.....		X		
Manifolds—replace.....	X			
Manifolds—rebuild.....			X	
Motor assembly, starting—replace.....	X			
Motor assembly, starting—repair.....		X		
Motor assembly, starting—rebuild.....			X	
Pan assembly, oil—service and replace gaskets..	X			
Pan assembly, oil—replace and or repair.....		X		
Pistons and rings—replace.....		E	X	
Plugs, spark—service, adjust and or replace....	X			
Plugs, spark (two piece)—repair.....		X		
Points, distributor breaker—adjust and or replace. .	X			
Pump assembly, fuel—service and or replace..	X			
Pump assembly, fuel—repair.....		X		
Pump assembly, fuel—rebuild.....			X	
Pump assembly, oil—replace and or repair.....		X		
Pump assembly, oil—rebuild.....			X	
Pump assembly, water—replace.....	X			
Pump assembly, water—repair.....		X		
Pump assembly, water—rebuild.....			X	
Rods, connecting—replace.....		E	X	
Sprockets, timing chain—replace.....		X		
Thermostat—replace.....	X			
Valves—adjust.....	X			
Ventilator, crankcase—service and or replace..	X			
Wiring, ignition—replace.....	X			

EXHAUST GROUP

Muffler and exhaust pipes—replace..... X

EXTINGUISHER, FIRE

Extinguisher, fire (carbon tetrachloride CCl_4)—
service (refill) and/or replace..... X

Extinguisher, fire (carbon tetrachloride CCl_4)—
repair..... X

Extinguisher, fire (carbon tetrachloride CCl_4)—
rebuild.....

INTRODUCTION

FRAME	ECHELONS			
	2nd	3rd	4th	5th
Bumpers—replace.....	X			
Bumpers—repair.....		X		
Frame assembly—repair.....		X		
Frame assembly—rebuild.....			X	
Hooks, towing—replace.....	X			
Hooks, towing—repair.....		X		
Pintle assembly—replace.....	X			
Pintle assembly—repair.....		X		
Pintle assembly—rebuild.....			X	
Shackles and bolts—replace.....	X			
Spring assemblies, front suspension—replace ...	X			
Spring assemblies, front suspension—repair		X		

FUEL GROUP

Filter assembly, fuel—service and/or replace ...	X
Lines and connections—replace and/or repair ..	X
Tank—service and/or replace.....	X
Tank—repair.....	X

INSTRUMENTS

Instruments—replace.....	X			
Instruments—repair.....		X		
Instruments—rebuild.....			E	X

MISCELLANEOUS

Boards, running—replace.....	X			
Boards, running—repair.....		X		
Drive assembly, speedometer—replace.....	X			
Drive assembly, speedometer—repair.....		X		
Fenders—replace.....	X			
Fenders—repair.....		X		
Hood assembly—replace and/or repair.....		X		

POWER TAKE-OFF

Controls and linkage—replace.....	X			
Controls and linkage—repair.....		X		
Power take-off assembly—replace.....		X		
Power take-off assembly—repair.....		X		
Power take-off assembly—rebuild.....			E	X

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	ECHELONS			
	2nd	3rd	4th	5th
SHAFTS, PROPELLER				
Block assembly, pillow (1½ ton, 6 x 6)—replace	X			
Block assembly, pillow (1½ ton, 6 x 6)—repair		X		
Block assembly, pillow (1½ ton, 6 x 6)—rebuild			X	
Shaft assemblies, propeller (w/universal joints)— replace	X			
Shaft assemblies, propeller (w/universal joints)— repair		X		
Shaft assemblies, propeller (w/universal joints)— rebuild			X	
STEERING GROUP				
Arm, steering (pitman)—replace	X			
Gear assembly, steering—adjust	X			
Gear assembly, steering—replace and/or repair		X		
Gear assembly, steering—rebuild			E	X
Link assembly, drag—replace	X			
Link assembly, drag—repair		X		
Wheel, steering—replace	X			
TIRES				
Casings and tubes—replace	X			
Casings—repair			X	
Tubes, inner—repair	X			
TRANSMISSION				
Drum, parking brake ($\frac{3}{4}$ ton, 4 x 4)—replace	X			
*Transmission assembly—replace	*	X		
Transmission assembly—repair		X		
Transmission assembly—rebuild			E	X
VEHICLE ASSEMBLY				
Truck assembly—service	X			
Truck assembly—rebuild (with serviceable unit assemblies)			X	
WHEEL				
Wheels—replace	X			
Wheels—rebuild			E	X

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INTRODUCTION

WINCH	ECHELONS			
	2nd	3rd	4th	5th
Band assembly, safety brake—adjust and/or re- place.....	X			
Band assembly, safety brake—repair (reline)...		X		
Cable assembly—replace.....	X			
Cable assembly—repair.....		X		
Pin, universal joint, shear—replace.....	X			
Shaft assembly, propeller—replace.....	X			
Shaft assembly, propeller—repair.....		X		
Shaft assembly, propeller—rebuild.....			X	
Shoe assembly, drag brake—adjust and/or re- place.....	X			
Shoe assembly, drag brake—repair (reline).....		X		
*Winch assembly—replace.....	*	X		
Winch assembly—repair.....		X		
Winch assembly—rebuild.....			E	X

*The second echelon is authorized to remove and reinstall items marked by an asterisk. However, when it is necessary to replace an item marked by an asterisk with a new or rebuilt part, subassembly or unit assembly, the assembly marked by an asterisk may be removed from the vehicle by the second echelon *only after authority has been obtained from a higher echelon of maintenance.*

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)

CHAPTER 2
POWER TRAIN

Section I

GENERAL DESCRIPTION

	Paragraph
General description	5
Data and specifications	6

5. GENERAL DESCRIPTION.

- a. Power developed by the engine is transmitted through the clutch to the transmission (figs. 2 and 3). Power enters the transmission by the main drive pinion at the front of the transmission and leaves by the main shaft at the rear of the transmission. When the gearshift lever is in the fourth speed position, the main shaft is directly connected with the main drive pinion and the power passes directly through the transmission. When the gearshift lever is in first, second or third speed position, power is transmitted from the drive pinion to the countershaft then through reduction gears of various ratios, depending upon the position of the lever, to the main shaft.
- b. From the transmission the power is transmitted through the intermediate propeller shaft to the transfer case (figs. 2 and 3) where it is distributed through front and rear propeller shafts to the front and rear axle assemblies.
- c. The power enters the differential and carrier assembly (figs. 2 and 3) through a drive pinion and ring gear. The differential assembly distributes the power to each axle drive shaft through which it is transmitted to the wheels.
- d. Through a power take-off (figs. 2 and 3) which is mounted on the side of the transmission of trucks equipped with winch, power is taken from the transmission countershaft and transmitted to the winch assembly through a propeller shaft.

6. DATA AND SPECIFICATIONS.

- a. Transmission:
MakeNew Process
TypeSelective sliding
SpeedsFour forward—One reverse

GENERAL DESCRIPTION

RA PD 53426

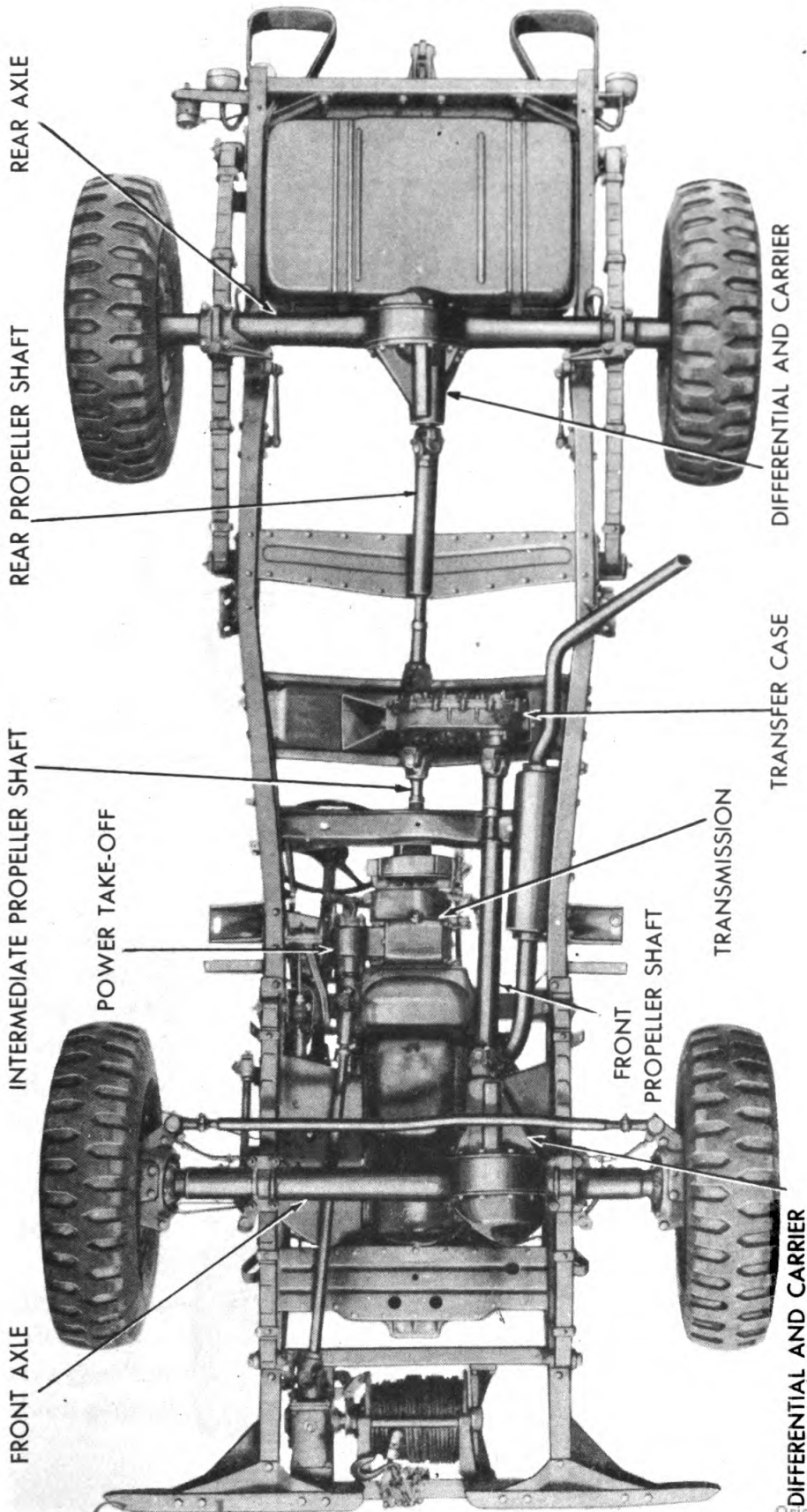
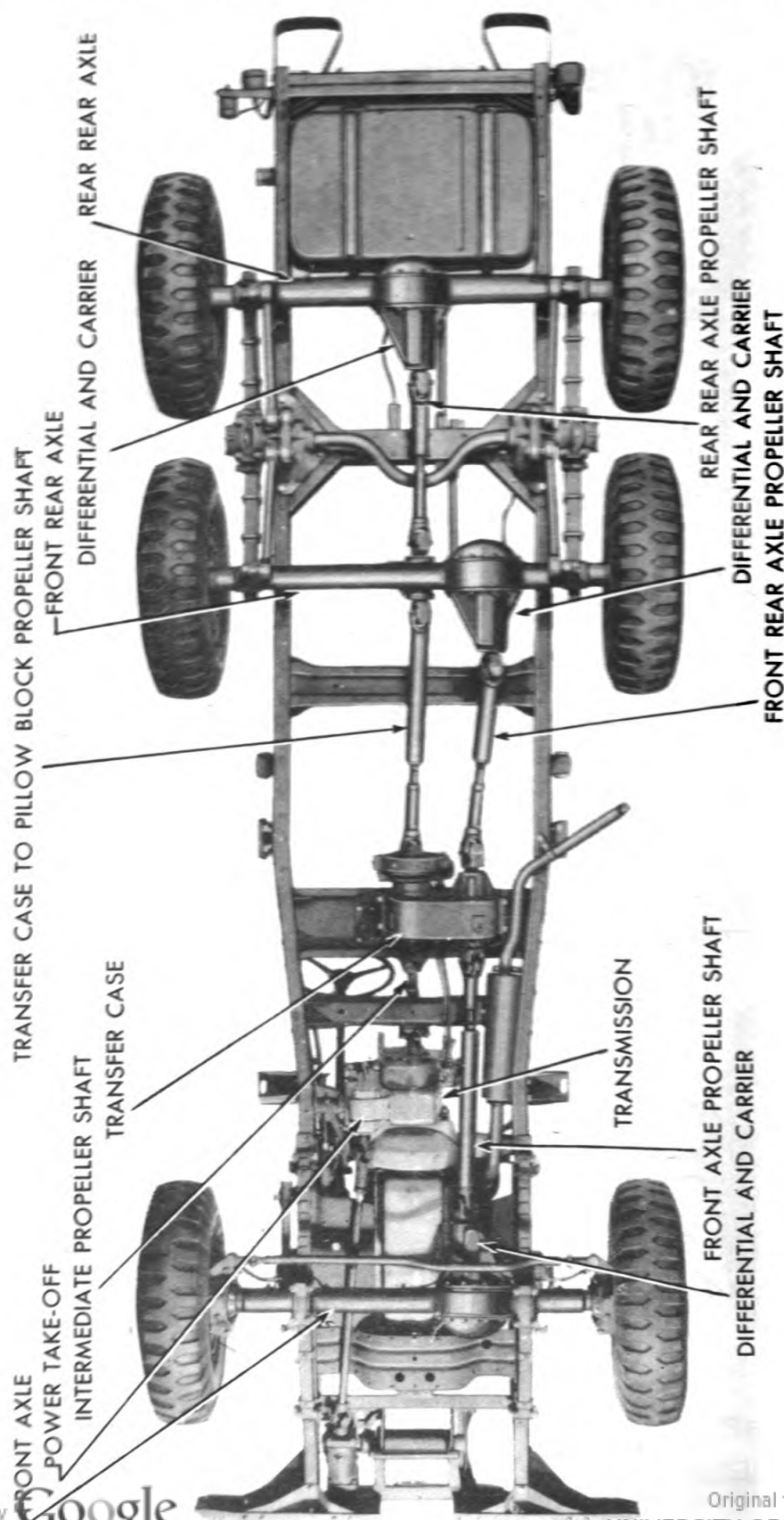


Figure 2—Power Train (1 Ton, 4 x 4 Truck)

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1 $\frac{1}{2}$ TON 6 x 6 (DODGE)



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Figure 3—Power Train (1 $\frac{1}{2}$ Ton, 6 x 6 Truck)

GENERAL DESCRIPTION**Lubricant Capacity**

With power take-off.....7 pt

Without power take-off.....5½ pt

Gear Ratio

First speed.....6.40 to 1

Second speed.....3.09 to 1

Third speed.....1.69 to 1

Fourth speed.....Direct

Reverse.....7.82 to 1

Bearings

Main shaft—drive pinion.....SKF 1-71140 or MR 209M

Main shaft—rear.....SKF 465853 or MR 307S

Main shaft—pilot.....Hyatt RA-99000

Countershaft—front and rear.....Hyatt RA-95540

Reverse idler gear bushing.....Bronze bushing

b. Power Take-off:

Make.....Detroit Harvester

Number.....4100-G

Drive.....From transmission

Control.....Shift lever in cab

c. Transfer Case ($\frac{3}{4}$ Ton, 4 x 4 Truck):

Make.....New Process

Location.....Amidship

Number of speeds.....1

Ratio.....Direct

Lubricant capacity.....3 pt

Shaft bearing make.....Timken

Cup number.....14276

Cone number.....14124

d. Transfer Case (1½ Ton, 6 x 6 Truck):

Make.....New Process

Location.....Amidship

Number of speeds.....2

Ratio—high range.....1 to 1

low range.....1.5 to 1

Lubricant capacity.....5 pt

Shaft bearings—make.....Timken and Marlin Rockwell

Drive gear shaft bearings (2).....SKF 6307 N.R.

Driven gear shaft bearing (rear).....Cone (2) Timken 3780

Cup (2) Timken 3700

(Front) cone (2) Timken 2793

Cup (2) Timken 2720

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
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Idler gear shaft bearings.....Cone (2) Timken 2793
Cup (2) Timken 2720

e. Propeller Shafts and Universal Joints:

Propeller shaft

Make.....Universal Products Co.

Model..... $\left\{ \begin{array}{l} 5160\text{—except transmission to transfer case} \\ 5360\text{—transmission to transfer case} \end{array} \right.$

Diameter2½ in.

Universal joint

Type.....Cross and trunnion

Bearing type.....Cageless roller

Pillow block (1½ ton, 6 x 6 truck)

Bearings.....Cup (2) Timken 14276

Cone (2) Timken 14137A

f. Front Axle:

Type.....Full floating

MakeDodge

Road clearance.....10 $\frac{23}{32}$ in.

Universal drive assembly—make.....Bendix-Weiss

Wheel bearing—outer (2).....Timken cup—2924 Cone—2984

Wheel bearing—inner (2).....Timken cup—28622 Cone—28682

Steering knuckle flange bearings

upper (2).....Timken cup—23256 Cone—Leaded gun metal

Steering knuckle flange bearings

lower (2).....Timken cup—23256 Cone—23100

g. Differential ($\frac{3}{4}$ Ton, 4 x 4 Truck):

MakeDodge

Drive gear and pinion.....Hypoid

Ratio5.83 to 1

Differential side

bearings (2)Timken cup—28521 Cone—28580—up to
—33821 —33891—after

Pinion bearing

outer (1)Timken cup—3820 Cone—3878 —up to
—A14558 —after

Pinion bearing

inner (1)Timken cup—46368 Cone—46176—up to
—59412 —59187—after

h. Differential (1½ Ton, 6 x 6 Truck):

MakeDodge

Drive gear and pinion.....Hypoid

GENERAL DESCRIPTION

Ratio	5.83 to 1
Differential side bearings (2)	Timken Cone—33891 Cup—38821
Pinion bearing (front) (1)	Timken A-14558
Pinion bearing (rear) (1)	Timken Cone—59187 Cup—59412

i. Rear Axle:

Type	Full floating
Make	Dodge
Road clearance	10 ³ / ₃₂ in.
Drive shaft diameter—at spline	1.370 in.
Drive shaft diameter—at center	1.250 in.
Wheel bearing—inner (2)	Timken Cup—28622 Cone—28682
Wheel bearing—outer (2)	Timken Cup—2924 Cone—2984
Differential	Same as in front axle

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
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CHAPTER 2

POWER TRAIN (Cont'd)

Section II

TROUBLE SHOOTING

	Paragraph
Transmission and power take-off.....	7
Transfer case	8
Propeller shafts and universal joints.....	9
Front axle	10
Rear axle	11

7. TRANSMISSION AND POWER TAKE-OFF.

a. Hard Shifting of Transmission Gears:

Possible Cause	Possible Remedy
Clutch does not release.	Adjust clutch pedal or replace necessary parts.
Gearshift lever binding in top of gearshift lever housing.	Force rubber dust cover away from top of housing and oil the gearshift lever ball.
Shift rails bind in gearshift lever housing.	Inspect housing and repair (pars. 17-19).
Sliding gears binding on splines of main shaft.	Remove main shaft and eliminate cause of binding (pars. 14-16).
Clutch disk hub binds on splines of drive pinion.	Remove clutch and free up hub.
Engine idling too fast.	Adjust idling speed.
Damaged gear teeth.	Inspect transmission (pars. 14-16).

b. Noisy Operation of Transmission:

Lubricant low.	Add lubricant to specified level.
Worn or damaged gears or bearings.	Disassemble and inspect transmission (pars. 14-16).

TROUBLE SHOOTING**c. Transmission Slips Out of Gear**

Possible Cause	Possible Remedy
Misalignment between transmission case and clutch housing.	Check for presence of dirt between housings or damage to contacting surfaces.
Shift rail poppet ball stuck or spring broken.	Remove transmission gearshift lever housing and inspect (pars. 17-19).
Shift fork bent.	Replace fork (pars. 17-19).
Shift fork loose on rail.	Remove transmission cover and tighten fork to rail (pars. 17-19).
Worn or damaged gears or bearings.	Rebuild transmission (pars. 14-16).
Sliding gears or main shaft splines worn.	Replace shaft and gear (pars. 14-16).

d. Transmission Lubricant Leakage:

Excessive amount of lubricant in transmission.	Lower lubricant to level of filler hole when transmission is heated from operation.
Worn rear bearing oil seal, worn main shaft or drive pinion bearings, worn propeller shaft companion flange.	Replace part or parts (pars. 14-16).
Damaged or cocked bearing retainers.	Install new retainers or loosen and tighten evenly if not damaged.
Insufficient gaskets at main drive pinion bearing retainer or at rear bearing retainer.	Install proper amount of gaskets (pars. 14-16).
Leakage at cap screws.	Remove, dip in white lead and reinstall.

e. Engagement of Two Speeds:

Interlock pin in third and fourth shift rail broken or missing.	Remove transmission gearshift lever housing, replace interlock (pars. 17-19).
Interlock plunger broken or missing.	Remove gearshift lever housing and replace plunger (pars. 17-19).

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
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Shift fork loose or broken.

Tighten or replace fork (pars. 17-19).

f. Backlash in Transmission:

Universal joint companion flange loose on transmission shaft.

Disconnect propeller shaft and tighten companion flange nut.

g. Power Take-off Lubricant Leakage:

Worn oil seals or damaged gaskets.

Replace oil seal or gasket.

Leakage at end plate bolts.

Remove bolts, dip in white lead and reinstall.

h. Power Take-off Overheats:

Lubricant low.

Bring transmission lubricant up to proper level (par. 23 f).

Bearing adjustment too tight.

Readjust bearings (par. 22).

Lack of clearance between countershaft gear and take-off gear.

Install gaskets to create proper clearance (par. 16 k).

i. Power Take-off Slips Out of Gear:

Weak or broken shifter shaft ball spring.

Replace spring (pars. 20-22).

Shift fork bent.

Straighten or replace (pars. 20-22).

Sliding gear or shaft splines worn.

Replace gear and shaft (pars. 20-22).

Worn or damaged gears.

Replace gears (pars. 20-22).

j. Power Take-off Gear Noise:

Improper clearance between transmission and take-off gears.

Adjust clearance (par. 16 k).

Worn or damaged gears or bearings.

Rebuild assembly (pars. 20-22).

Improperly adjusted bearings.

Adjust bearings (pars. 20-22).

Sliding gear too loose on splines of shaft.

Replace gear and shaft (pars. 20-22).

8. TRANSFER CASE.**a. Gear Noise:**

Insufficient lubricant.

Replenish lubricant.

Loose bearing adjustment.

Readjust bearings (pars. 26-28 or 32-34).

TROUBLE SHOOTING

Possible Cause	Possible Remedy
Damaged gears or bearings.	Rebuild assembly (pars. 26-28 or 32-34).
b. Hard Shifting:	
Shift lever seized to support pin on transmission cover.	Free up and lubricate lever.
Shift rail tight in case.	Free up rail by lubricating without removing.
Sliding clutch gear tight on splined shaft.	Disassemble unit and free up sliding clutch gear (pars. 26-28 or 32-34).
Twisted gear shaft.	Replace shaft (pars. 26-28 or 32-34).
Gear teeth damaged.	Replace gears (pars. 26-28 or 32-34).

c. Lubricant Leakage:

Excessive lubricant.	Drain lubricant to level of filler plug when case is heated from operation.
Vent nipple in case clogged.	Remove and clean vent.
Worn oil seals or damaged gaskets.	Replace oil seals or gaskets (pars. 26-28 or 32-34).
Worn propeller shaft yoke.	Replace yoke.
Loose bearings.	Adjust or replace bearings (pars. 26-28 or 32-34).

d. Case Overheats: (The normal operating temperature of the transfer case is high; therefore, the assembly should not be considered as overheated unless abnormal gear noise or lubricant leakage past the oil seals develops.)

Lubricant too high or too low. (Either condition will cause high operating temperature.)	Drain or fill to proper level.
Vent nipple in case plugged.	Remove and clean vent.
Bearings adjustment too tight.	Readjust bearings (pars. 26-28 or 32-34).

e. Front Axle Drive Disengages:

Improper adjustment of control rods.	Adjust rods (par. 29 b or 35 b).
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Possible Cause	Possible Remedy
Weak or broken shift rail poppet spring.	Replace spring (pars. 26-28 or 32-34).
Excessively worn or damaged gears.	Rebuild assembly (pars. 26-28 or 32-34).
Loose bearings.	Adjust bearings (pars. 26-28 or 32-34).

f. Backlash:

Loose propeller shaft companion flange.	Remove propeller shaft and tighten companion flange nut.
Case loose in mounting brackets.	Tighten mounting cap screws.
Loose bearing adjustment.	Adjust bearings (pars. 26-28 or 32-34).
Worn gears or spline shaft.	Replace shaft and gears (pars. 26-28 or 32-34).

9. PROPELLER SHAFT AND UNIVERSAL JOINTS.

a. Backlash or Noise:

Worn or damaged cross, bearing or yoke.	Replace necessary parts (par. 38).
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b. Loss of Lubricant:

Worn dust washers.	Replace (par. 38 or 40).
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c. Excessive Vibration in Drive Line:

Propeller shaft sprung.	Replace shaft (pars. 37, 38 and 39).
Universal joint loose.	Repair joint (par. 38).
Assembly arrows on shaft and splined yoke not in line.	Remove yoke from shaft and install with arrows in line (par. 38 g).

10. FRONT AXLE.

a. Lubricant Leakage: (The differential lubricant is confined to the differential and drive pinion sections of the axle housing by the drive pinion bearing oil slinger, the drive pinion oil seal and the universal drive shaft oil seal. The universal drive shaft joint lubricant is retained in the universal joint and steering knuckle housings by the housing bushing and the steering knuckle bushing. Wheel bearing lubricant is retained by the front wheel bearing oil seal.)

TROUBLE SHOOTING

(1) LUBRICANT LEAK AT DRIVE PINION:

Possible Cause	Possible Remedy
Lubricant too high.	Drain to level of filler plug when case is heated from operation.
Axle housing vent clogged.	Remove and clean vent.
Pinion bearing oil seal, slinger or propeller shaft companion flange worn or damaged.	Replace worn parts (par. 43 f).

(2) DIFFERENTIAL LUBRICANT PASSES INTO UNIVERSAL DRIVE JOINT HOUSING:

Differential lubricant too high.	Drain to level of filler plug when case is heated from operation.
Axle housing vent clogged.	Remove and clean vent.
Universal drive shaft oil seal worn or damaged.	Replace seal (par. 43 c).

(3) LUBRICANT LEAK AT DIFFERENTIAL COVER GASKET:

Stud nuts loose or gasket damaged.	Tighten stud nuts or replace gasket.
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(4) LUBRICANT LEAKING INTO BRAKE DRUM:

Loose wheel bearings.	Adjust bearings (par. 49 i).
Wheel bearing oil seal worn or damaged.	Replace oil seal.
Wheel bearings packed with improper or excessive lubricant.	Clean and repack wheel bearings.
Differential and/or universal joint lubricant passing steering knuckle bushing, causing improper and excessive lubricant in wheel bearings.	Replace universal drive shaft oil seal or steering knuckle bushing (par. 43 c).

b. Backlash Between Propeller Shaft and Wheels:

Propeller shaft universal joint worn or damaged.	Repair universal joint (par. 38).
Propeller shaft companion flange loose on pinion shaft.	Remove propeller shaft (par. 37) and tighten flange nut.
Universal drive assembly worn or damaged.	Repair universal joint (par. 38).
Worn or damaged parts in differential carrier assembly.	Repair differential carrier (pars. 59-60).

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c. **Noise in Axle:** (Certain road surfaces cause tire noise that may seem to come from the axle. Before attempting to eliminate axle noise be sure the noise is not caused by the tires. A certain amount of gear noise in the transfer case is also normal and should not be confused with axle noises. Do not attempt to locate axle noise by operating the vehicle with the wheels off the ground.)

Possible Cause	Possible Remedy
Lack of lubrication.	Replenish lubricant.
Wheel bearings worn or damaged.	Replace bearings.
Interference between brake parts and wheel hub or drum.	Remove brake drum and inspect for loose or damaged parts (par. 69).
Gears or bearings out of adjustment; worn or damaged parts in differential carrier assembly.	Repair differential carrier (pars. 59-60).

11. REAR AXLE.

a. **Lubricant Leakage at Drive Pinion** (par. 10 a (1)).

b. **Lubricant Leakage at Differential Cover Gasket** (par. 10 a (3)).

c. **Lubricant Leakage into Brake Drums:**

Wheel bearing oil seal (inner) worn or damaged, allowing wheel bearing lubricant to enter brake drums.	Replace inner oil seal.
Wheel bearing packed with improper or excessive lubricant.	Clean bearing and hubs and repack.
Wheel bearing oil seal (outer) allowing differential lubricant to mix with wheel bearing lubricant.	Clean bearings and hub, repack and replace oil seal.

d. **Backlash Between Propeller Shaft and Wheels:**

Propeller shaft universal joint worn or damaged.	Repair universal joint (par. 38).
Propeller shaft companion flange loose on pinion shaft.	Remove universal joint and tighten flange nut.
Gears or bearings out of adjustment; worn or damaged parts in differential carrier.	Repair differential carrier (pars. 59-60).

e. **Noise in axle** (par. 10 c).

CHAPTER 2

POWER TRAIN (Cont'd)

Section III

TRANSMISSION AND POWER TAKE-OFF

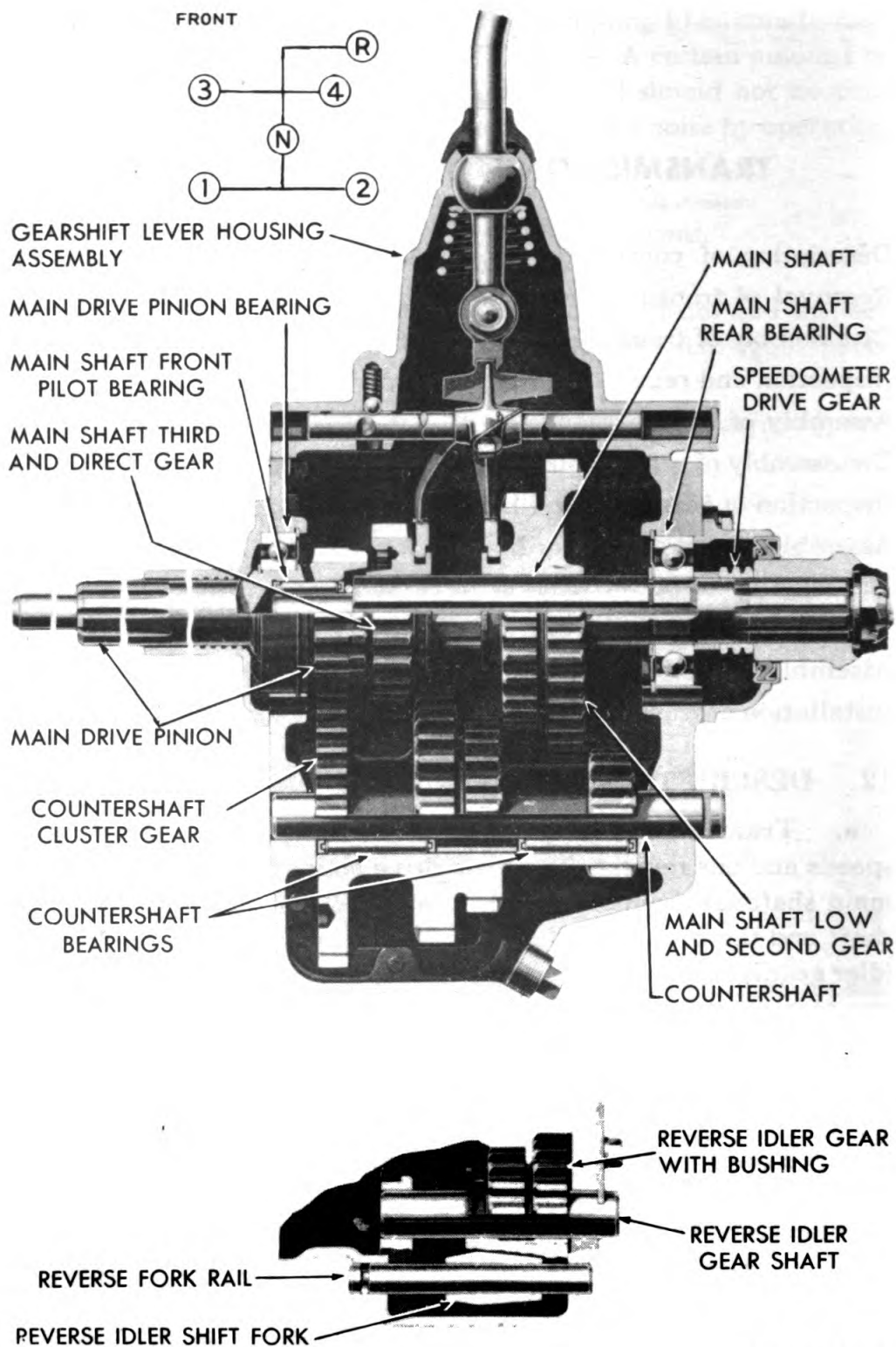
	Paragraph
Description of construction.....	12
Removal of transmission assembly.....	13
Disassembly of transmission.....	14
Inspection and repair of transmission parts.....	15
Assembly of transmission.....	16
Disassembly of gearshift lever housing.....	17
Inspection of gearshift lever housing parts.....	18
Assembly of gearshift lever housing.....	19
Disassembly of power take-off.....	20
Inspection of power take-off parts.....	21
Assembly of power take-off.....	22
Installation of transmission assembly.....	23

12. DESCRIPTION OF CONSTRUCTION.

a. **Transmission** (fig. 4). The transmission has four forward speeds and one reverse. The main drive pinion and the rear end of the main shaft are mounted on ball bearings. The front end of the main shaft and the countershaft are carried by roller bearings. The reverse idler gear is fitted with a bushing. Sliding gears on the main shaft which are controlled by the gearshift lever provide means of changing gear ratios or speeds. The reverse idler gear slides on its shaft to engage between the countershaft and the main shaft gears to reverse the direction of rotation of the main shaft.

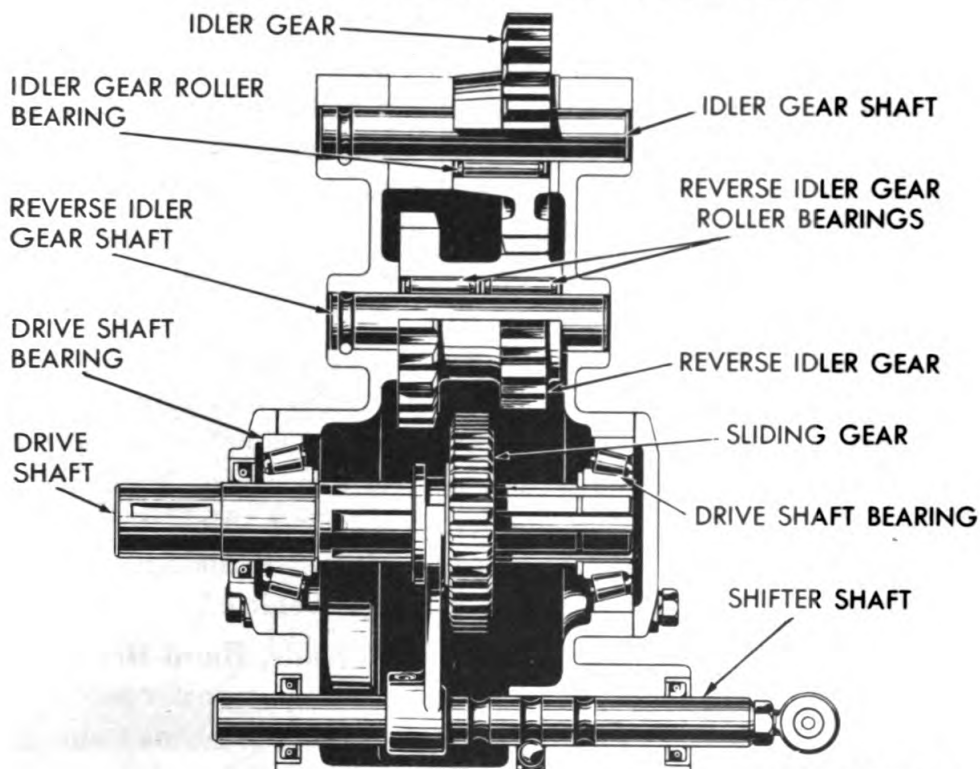
b. **Power Take-off** (fig. 5). The power take-off is mounted on the side of the transmission case and engages a gear on the transmission countershaft. The idler gear which runs in mesh with the transmission gear and the reverse idler gear are mounted on roller bearings. The drive shaft which carries the sliding gear is mounted on adjustable tapered roller bearings. The sliding gear which provides means of operating the winch drive in either direction of rotation slides on splines of the drive shaft and is controlled by the shifter shaft connected to a lever in the driver's compartment.

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RA PD 53428

Figure 4—Transmission

TRANSMISSION AND POWER TAKE-OFF

RA PD 53434

Figure 5—Power Take-off**13. REMOVAL OF TRANSMISSION ASSEMBLY.**

a. Remove Floor Mat (Ambulance only). Tilt the attendant's seat forward and remove the four cap screws from the seat support bracket. Raise the driver's seat to its highest position and tilt forward. Remove the seat adjusting mechanism to floor cap screws. Remove the cotter pin and pin from the accelerator pedal rod. Remove the screws from floor mat front section. Remove the mat. Remove the screws from the center and two end linoleum retainers. Remove the screws from the mat extension and remove the extension.

b. Drain Lubricant. Place a drain pan under the transmission, remove the drain and filler plug, and drain out the lubricant.

c. Remove Floor Plates. Remove the spare tire lock. Remove the spare wheel and tire assembly from the carrier (except Ambulance). Remove the clutch and brake pedal draft pad retainers. Remove the left floor plate screws and the plate. Unhook the throttle control spring from the throttle bell crank rod at right floor plate. Remove the right floor plate screws and plate.

d. Remove Floor Center Panel. Remove the floor center panel cap screws. Remove the cotter pin and pin from the pedal where it attaches to the accelerator rod and disconnect the pedal from the rod

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If the vehicle is equipped with a power take-off, remove the cotter pin from the clevis pin in the control lever end plate. Lift the center panel and remove the cotter pin and washer from the power take-off shifter shaft eyebolt and pin. Then move the control lever out of the end plate and remove the lever from the vehicle. Move the hand brake lever and transfer case control levers back so they will not interfere with the removal of the floor panel, and lift the panel out of the vehicle.

e. Disconnect Power Take-off (if so Equipped) (fig. 6). Remove the lock wire and loosen the set screw that holds the drive shaft collar ahead of the rear universal joint of the winch propeller shaft. Remove the lock wire and loosen the set screw that holds the rear universal joint on the power take-off drive shaft. Slide the rear universal joint forward on the winch propeller shaft to disengage the joint from the shaft and lower the shaft under the vehicle.

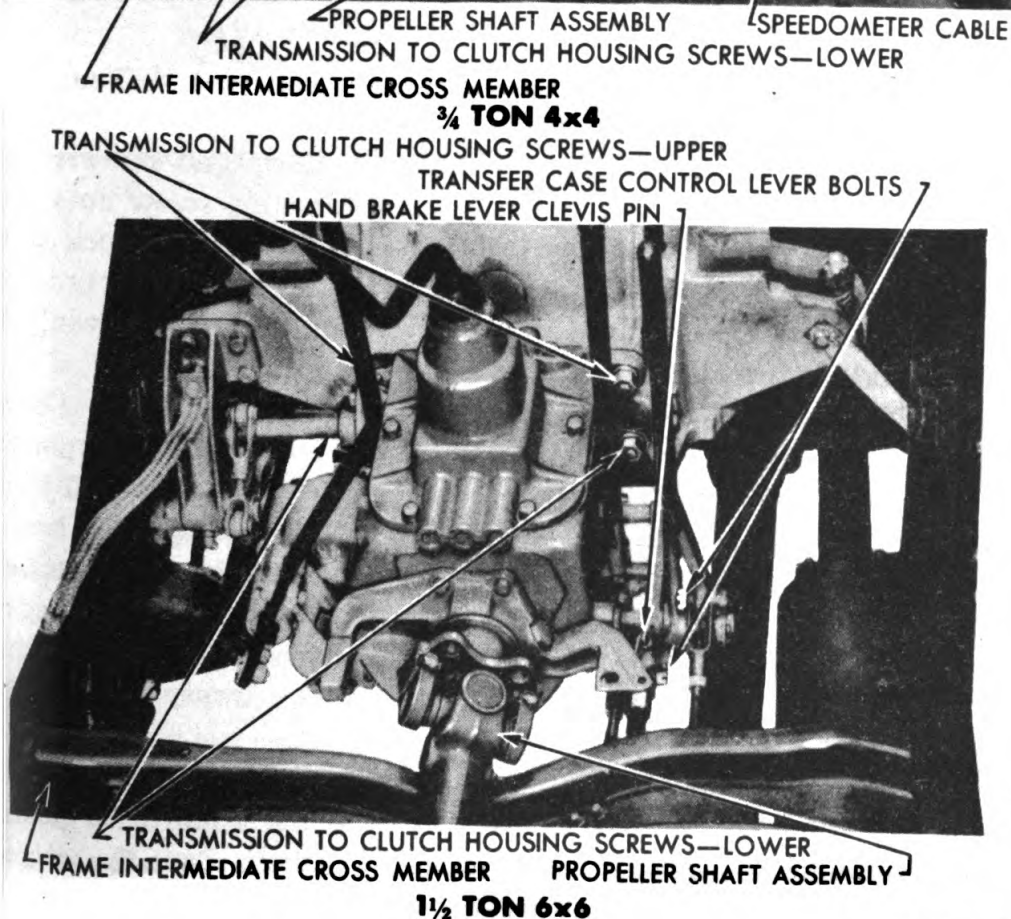
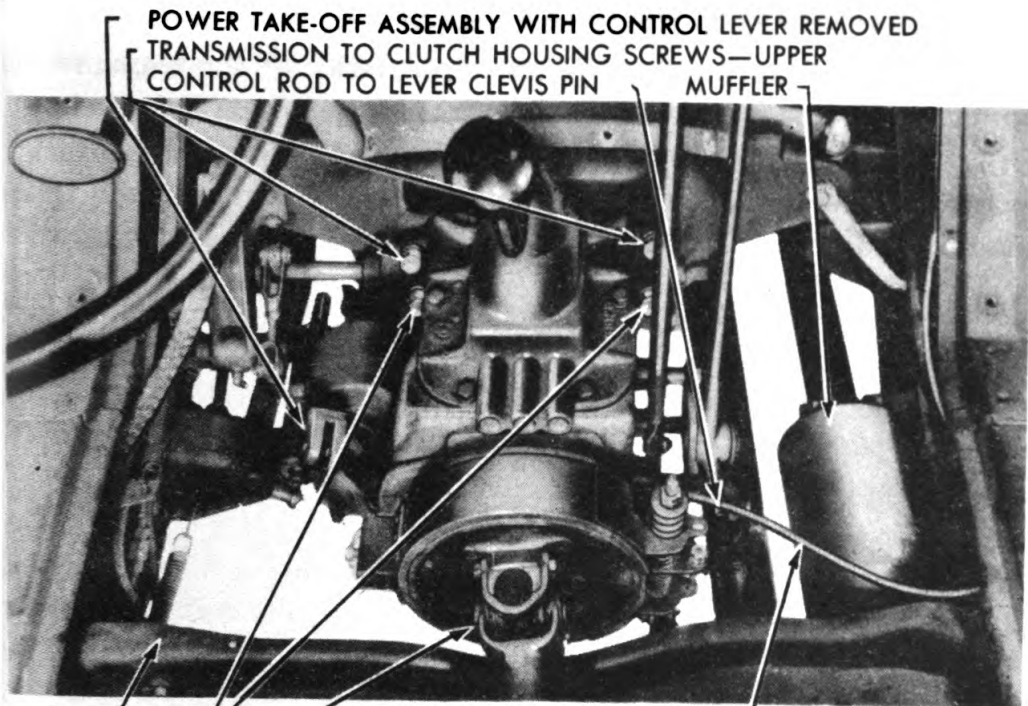
f. Disconnect Transfer Case Control Rods, Hand Brake Cable and Speedometer Cable (fig. 6). Disconnect the transfer case control rods at the transmission end. Disconnect both ends of the hand brake cable on the 1½ ton, 6 x 6 truck. Disconnect the speedometer cable housing from the transmission on the $\frac{3}{4}$ ton, 4 x 4 truck.

g. Loosen and Move Intermediate Frame Cross Member (except Ambulance) (fig. 6). Remove the two bolts and nuts and the two cap screws that attach the rear gusset to the cross member and left frame side member. Remove the two cross member to front gusset cap screws. Remove the two bolts and nuts that attach the cross member to the upper flange of the left and right frame side members. Remove the two large bolts and nuts from cross member to right frame side member. Move the cross member toward the rear of truck as far as it will go.

h. Disconnect Propeller Shaft (fig. 6). Open the universal joint clamp bolt nut locks and remove the nuts. Remove the bolts and locks, then the universal joint clamps. Slide the splined yoke on the shaft as far as it will go to disengage from transmission.

i. Remove Transmission (fig. 6). Remove the two upper transmission to clutch housing cap screws and screw pilot studs in place of the cap screws to guide the transmission while removing it. Pilot studs can be made by sawing the heads from $\frac{9}{16}$ -inch 12 x $\frac{3}{4}$ -inch cap screws and slotting the ends for a screwdriver. Remove the two lower transmission attaching cap screws. Place a jack under the transmission to support it and move it toward the rear until the main drive pinion is released from the clutch disk. Then lower the transmission to the floor and remove it from under the vehicle.

TRANSMISSION AND POWER TAKE-OFF



RA PD 53502

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1 $\frac{1}{2}$ TON 6 x 6 (DODGE)

14. DISASSEMBLY OF TRANSMISSION.

a. **Clean Transmission.** Wash the exterior of the transmission with dry-cleaning solvent, and dry with compressed air.

b. **Remove Gearshift Lever Housing and Power Take-off.** Remove the screws that attach the gearshift lever housing to the transmission, and remove the housing and gasket. On winch-equipped vehicles, lay the transmission on its side, remove the screws that attach the power take-off to the transmission and carefully remove the power take-off. Save the power take-off to transmission gaskets for reassembly. Refer to paragraphs 17-19 for gearshift lever housing rebuilding procedure, and paragraphs 20-22 for power take-off rebuilding procedure.

c. **Mount Transmission in Fixture.** Bolt the transmission into position in a transmission fixture.

d. **Remove Hand Brake Lever and Transfer Case Control.** Disconnect the hand brake rod at the transmission end and disconnect the brake spacer from the sector ($\frac{3}{4}$ ton, 4 x 4 trucks). Remove the cap screws from the control lever and bracket and remove the assembly together with the spacers and the brake lever and sector.

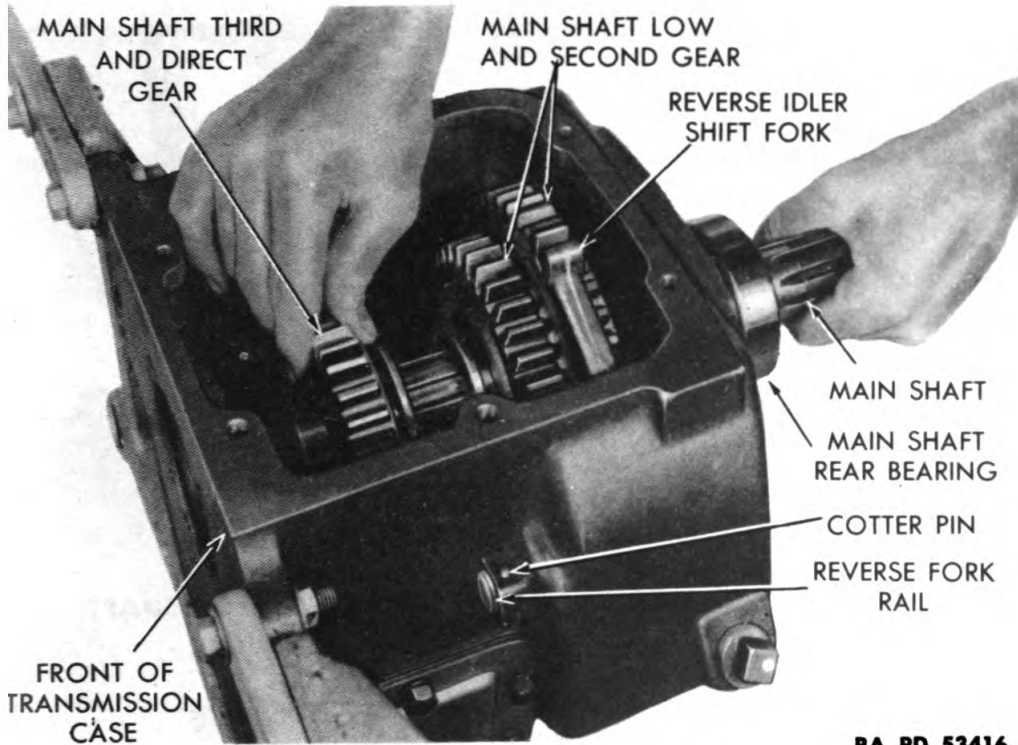
e. **Remove Hand Brake Assembly ($\frac{3}{4}$ Ton, 4 x 4 Trucks).** Remove the lock nut and adjusting nut, the plain washer and operating spring from the adjusting bolt. Pull the bolt down and remove the adjusting bolt springs. Remove the bracket adjusting screw nuts and remove the screw. Remove the brake band anchor screw lock wire and remove the screw. Slide the brake band off the anchor bracket and, at the same time, remove the coiled spring located between the brake band anchor clip and the anchor bracket.

f. **Remove Rear Bearing Retainer and Speedometer Gear.** Remove the speedometer pinion retaining nut and remove the pinion ($\frac{3}{4}$ ton, 4 x 4 trucks). Remove the cotter pin from the universal joint flange nut and remove the nut. Tap the universal joint flange or brake drum and remove the assembly. Remove the rear bearing retainer cap screws and remove the retainer assembly together with the paper spacer gaskets. Preserve the gaskets for assembly. Remove the speedometer drive gear and/or spacer from the transmission main shaft.

g. **Remove Main Drive Pinion and Bearing, and Main Shaft Pilot Bearing.** Remove the cap screws from the main drive pinion bearing retainer and remove the retainer and gaskets. Save the gasket for assembly. Pull the main drive pinion and bearing from the transmission. Remove the main shaft pilot bearing from the main shaft from the drive pinion.

TRANSMISSION AND POWER TAKE-OFF

h. Remove Main Shaft and Sliding Gears (fig. 7). Tap the main shaft toward the rear of the transmission case until the rear bearing is driven out of the case. Then remove the sliding gears from the shaft as it is removed from the case.



RA PD 53416

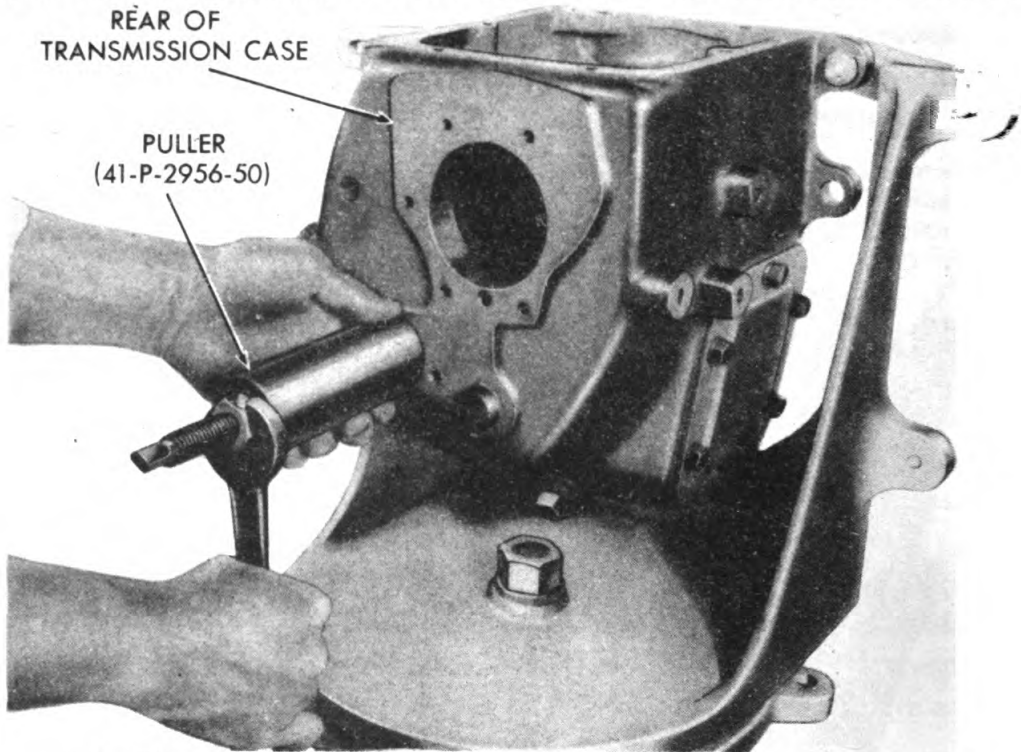
Figure 7—Removing Transmission Main Shaft

i. Remove Reverse Shift Fork Rail and Fork. Remove the cotter pin from the front of the reverse shift fork rail at the left side of the transmission case. Drive the rail out toward rear of transmission and remove the fork.

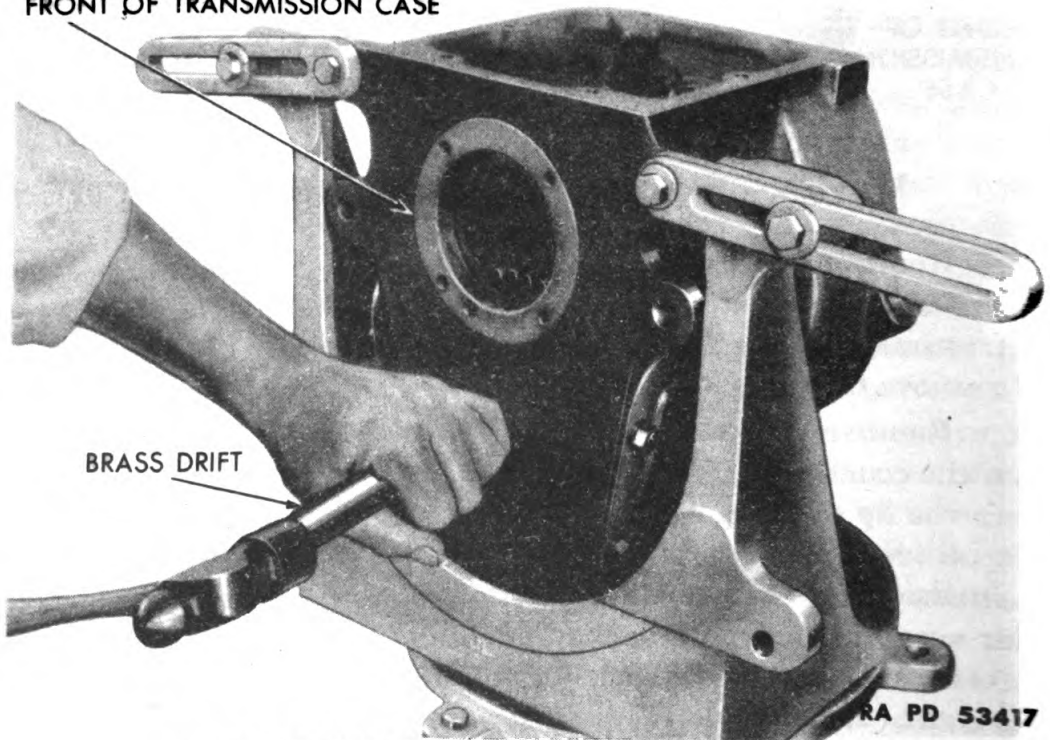
j. Remove Reverse Idler Shaft and Countershaft (fig. 8). Remove the countershaft and idler shaft lock plate at rear of transmission. Insert the lip of the puller screw tool into the slot of the reverse idler shaft. Slide the sleeve down over the puller screw so it rests on the transmission case and install the nut on the puller shaft. Tighten the puller screw nut and pull the shaft out of the case (1, fig. 8). Drive the countershaft out through the rear of the transmission case with a brass drift (2, fig. 8).

k. Remove Countershaft Cluster Gear and Reverse Idler Gear. Lift the countershaft cluster gear straight up and slide the small end out through the main shaft rear bearing opening and take out the two roller bearings and spacer. Then tilt the front end of the countershaft

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1—REMOVING TRANSMISSION REVERSE IDLER GEAR SHAFT
FRONT OF TRANSMISSION CASE



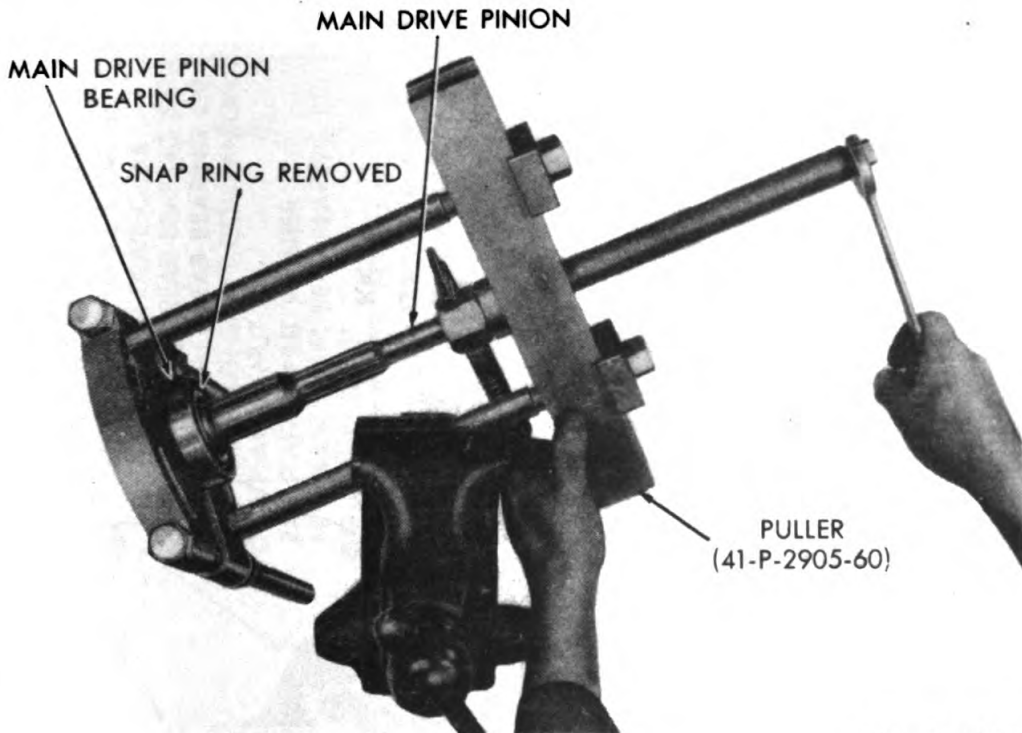
2—REMOVING TRANSMISSION COUNTERSHAFT

**Figure 8—Removing Transmission Reverse
Idler Gear Shaft and Countershaft**

TRANSMISSION AND POWER TAKE-OFF

cluster gear upward until it will pass out through the front of the gear-shift lever housing opening. Lift the reverse idler gear out of the case.

1. **Remove Bearings from Main Drive Pinion and Main Shaft** (fig. 9). Remove the snap ring from the groove in the main drive pinion that retains the ball bearing. Remove the ball bearings from the drive pinion and the main shaft with puller.



RA PD 53419

Figure 9—Removing Transmission Main Drive Pinion Bearing

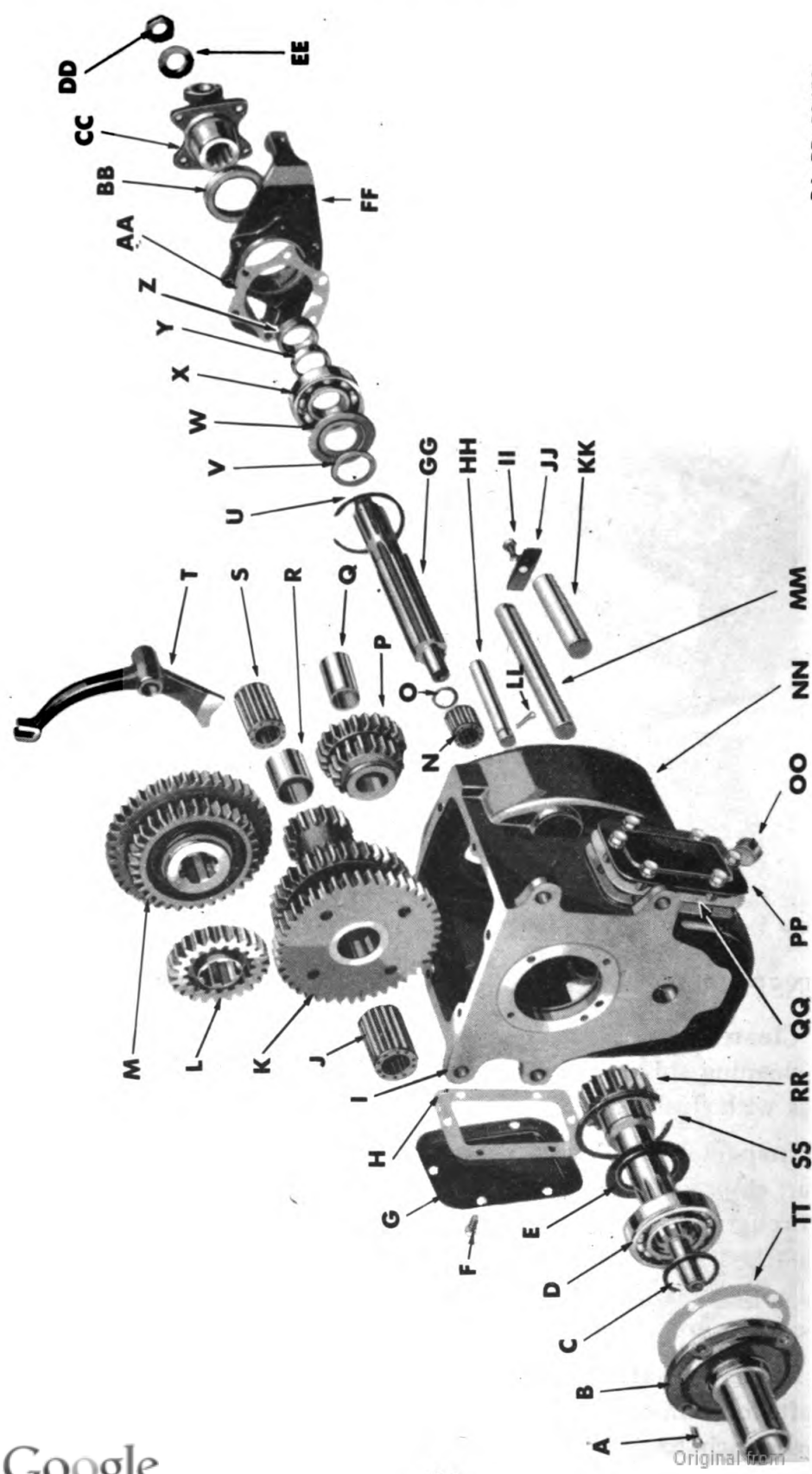
15. INSPECTION AND REPAIR OF TRANSMISSION PARTS.

a. **Clean Parts.** Wash all of the metal parts (except ball bearings) in dry-cleaning solvent, and dry with compressed air. Clean the ball bearings with flushing oil or light mineral oil.

b. **Inspect Gears** (fig. 10). Carefully examine the teeth of all gears for wear, chipping, cracks or hairline checking. Gear teeth that show wear through the surface hardening will be noisy. If the teeth are check marked or cracked, they are likely to break and damage the other transmission parts. Replace all gears whenever there is any indication that the parts are not satisfactory.

c. **Inspect Shafts and Bearings** (fig. 10). Inspect all bearings and shafts for damage or wear. The countershaft is originally machined to 0.9995 inch to 1.0000 inch. Measure the shaft with an outside

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Figure 10—Transmission Disassembled

TRANSMISSION AND POWER TAKE-OFF

- | | |
|---|--|
| A —SCREW AND LOCK WASHER | X —MAIN SHAFT REAR BEARING |
| B —MAIN DRIVE PINION BEARING RETAINER | Y —SPEEDOMETER DRIVE GEAR SPACER |
| C —MAIN DRIVE PINION SNAP RING | Z —SPEEDOMETER DRIVE GEAR |
| D —MAIN DRIVE PINION BEARING | AA —MAIN SHAFT REAR BEARING RETAINER GASKET |
| E —FRONT OIL RETAINER WASHER | BB —MAIN SHAFT REAR BEARING OIL SEAL |
| F —SCREW AND LOCK WASHER | CC —PROPELLER SHAFT COMPANION FLANGE |
| G —POWER TAKE-OFF OPENING COVER | DD —FLANGE NUT |
| H —POWER TAKE-OFF OPENING COVER GASKET | EE —FLANGE NUT WASHER |
| I —CASE | FF —MAIN SHAFT REAR BEARING RETAINER |
| J —COUNTERSHAFT BEARING | GG —MAIN SHAFT |
| K —COUNTERSHAFT CLUSTER GEAR | HH —REVERSE SHIFT FORK RAIL |
| L —MAIN SHAFT THIRD AND DIRECT GEAR | II —SCREW AND LOCK WASHER |
| M —MAIN SHAFT LOW AND SECOND GEAR | JJ —COUNTERSHAFT AND IDLER SHAFT LOCK PLATE |
| N —MAIN SHAFT PILOT BEARING | KK —REVERSE IDLER SHAFT |
| O —MAIN SHAFT PILOT BEARING SPACER | LL —COTTER PIN |
| P —REVERSE IDLER GEAR | MM —COUNTERSHAFT |
| Q —REVERSE IDLER GEAR BUSHING | NN —CASE |
| R —COUNTERSHAFT BEARING SPACER | OO —DRAIN PLUG |
| S —COUNTERSHAFT BEARING | PP —POWER TAKE-OFF OPENING COVER |
| T —REVERSE IDLER GEARSHIFT FORK | QQ —POWER TAKE-OFF OPENING COVER GASKET |
| U —MAIN SHAFT REAR BEARING SNAP RING | RR —MAIN DRIVE PINION |
| V —MAIN SHAFT REAR BEARING WASHER | SS —MAIN DRIVE PINION BEARING SNAP RING |
| W —REAR OIL RETAINER WASHER | TT —MAIN DRIVE PINION BEARING RETAINER GASKET |

RA PD 53452-B

Legend for Figure 10—Transmission Disassembled

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
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micrometer (41-C-307). If the diameter of the shaft is less than 0.9980 inch, replace it. The reverse idler gear bushing is finished to an inside diameter of 0.990 inch with a tolerance of plus 0.001 inch and minus zero. The reverse gear idler shaft is machined to 0.987 inch. Replace the shaft if worn more than 0.002 inch. Replace the gear assembly and/or shaft if the clearance between the shaft and gear bushing exceeds 0.006 inch.

d. Inspect Transmission Case (fig. 10). Examine the transmission case for cracks or damage of the machined surfaces and the bearing bores. If the snap rings in the transmission main shaft rear bearing bore and the drive pinion bore are removed, replace them.

e. Inspect Snap Rings, Oil Seals and Flange (fig. 10). Inspect the snap ring that retains the main drive pinion bearing on the pinion shaft and replace it if worn, cracked or bent. Whenever the main drive pinion bearing is removed, always replace the snap ring. Replace the oil seal in the main shaft rear bearing retainer if worn or damaged. Inspect the propeller shaft companion flange for scores or excess wear of the surface that contacts with the oil seal and replace if unsatisfactory to avoid rapid wear of the oil seal.

f. Replace Gaskets and Oil Seals (fig. 10). Use new gaskets and oil seals when assembling the transmission to prevent loss of lubricant. Drive the oil seal out of the main shaft rear bearing retainer. The oil seal is of the spring loaded leather type. Condition the leather in the seal to make it soft and pliable. Soak the new seal in thin warm oil for 30 minutes and then roll the seal with a smooth bar to soften the leather and remove all excess oil. Insert the conditioned oil seal assembly into the retainer so the lip of the leather faces towards the inside of the transmission and drive the seal into place with oil seal replacer (41-R-2395-40).

16. ASSEMBLY OF TRANSMISSION.

a. Install Reverse Idler Gear. Place the reverse idler gear in position in the transmission case with the shifting fork collar and the small gear facing toward the front of the transmission. Install the idler gear shaft through the rear of the transmission case and aline the locking slot of the shaft so that it will line up with the slot of the countershaft. Drive the idler gear shaft into place.

b. Install Countershaft Cluster Gear and Shaft. Lower the countershaft cluster gear into the transmission case with the large end up and the small end toward the rear. Move the small end through the rear main bearing opening and install one of the countershaft

TRANSMISSION AND POWER TAKE-OFF

roller bearings, then the spacer and the other roller bearing. Lower the cluster gear carefully toward the bottom of the case to prevent damage. Center the gear over the countershaft opening in the case and install the countershaft. Turn the shaft so the locking slot will line up with the lock plate and install the lock plate, lock washer and screw.

c. **Install Reverse Shift Fork and Rail.** Insert the reverse shift fork rail through the rear of the transmission. Insert the end of the rail in reverse gear collar and install the shift fork on the rail. Drive the rail through the case until the cotter pin can be inserted in the rail to lock it in place. Install a new cotter pin.

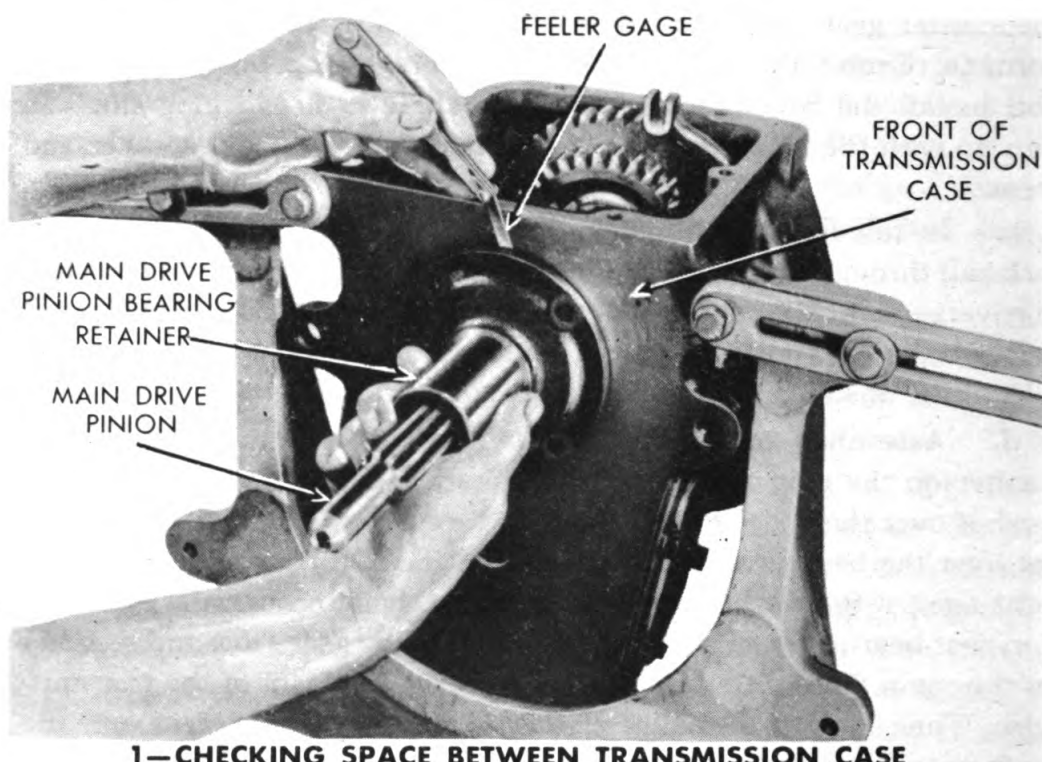
d. **Assemble and Install Main Shaft.** Install the rear bearing washer on the rear end of the main shaft and install the oil retainer washer over the bearing washer so the recess of the oil retainer washer fits over the bearing washer. Then press the ball bearing on the shaft tight against the washers. Install the main shaft through the transmission rear bearing opening. Slide the large sliding gear (low and second) on the main shaft with the shaft collar facing the front of the transmission. Then slide the smaller sliding gear (third and direct) on the shaft with the shift fork collar facing the rear of the transmission (fig. 7). Tap the main shaft lightly into position so the rear bearing is tight against the rear bearing snap ring.

e. **Assemble and Install Main Drive Pinion.** Install the oil retainer washer on the main drive pinion so the recess of the washer fits over the shoulder of the pinion shaft. Press the ball bearing on the pinion and fit a new snap ring tightly in the groove in the pinion. Place the main shaft pilot bearing spacer on the end of the main shaft and install the pilot bearing on the shaft. Install the main drive pinion so the gear end fits over the drive shaft pilot bearing. Tap the pinion into place to seat the bearing tightly against the snap ring in the case.

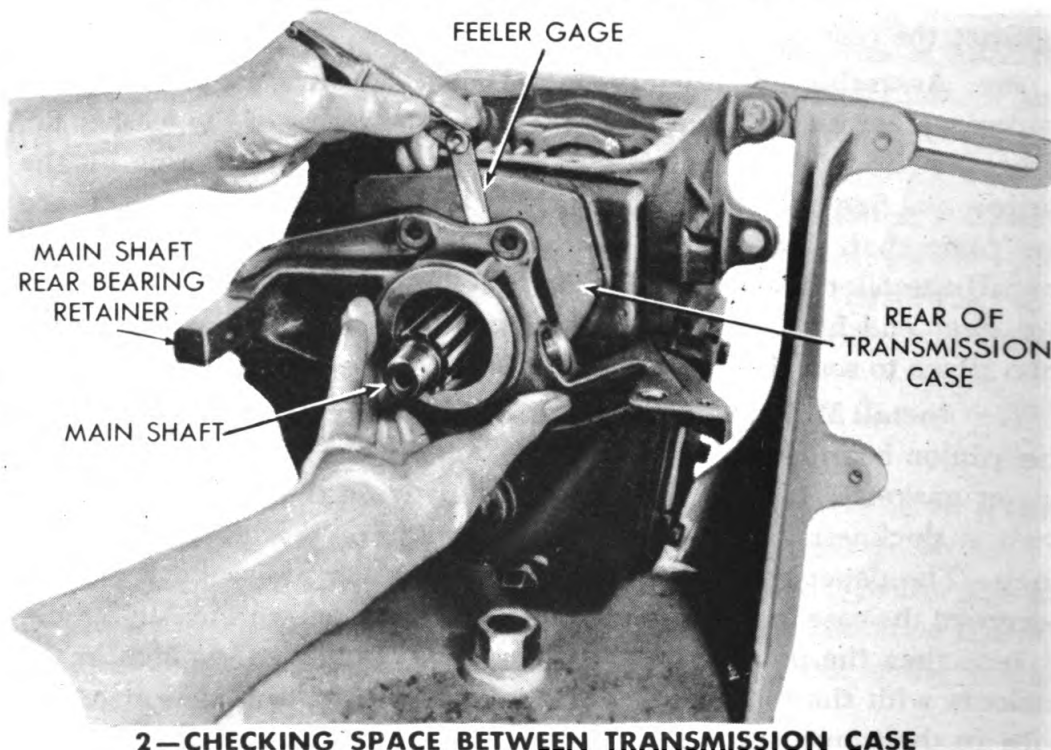
f. **Install Main Drive Pinion Bearing Retainer (1, fig. 11).** Hold the pinion bearing retainer in position against the bearing without the paper gaskets. Then measure the space between the case and retainer with a thickness gage (41-G-400) to determine the maximum clearance. The paper gaskets are 0.010 inch thick. Install enough gaskets between the case and retainer to equal the clearance within 0.005 more or less than the point of greatest clearance. Line up the notch in the gaskets with the machined groove in the retainer and the oil return hole in the transmission case. Install the two cap screws with the thin heads at the bottom of the retainer to provide clearance for throw-out mechanism. Tighten the retainer into position.

g. **Install Main Shaft Rear Bearing Retainer (2, fig. 11).** Fit

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**1—CHECKING SPACE BETWEEN TRANSMISSION CASE
AND MAIN DRIVE PINION BEARING RETAINER**



**2—CHECKING SPACE BETWEEN TRANSMISSION CASE
AND MAIN SHAFT REAR BEARING RETAINER**

RA PD 308891

Figure 11—Installing Transmission Bearing Retainer

TRANSMISSION AND POWER TAKE-OFF

the main shaft rear bearing retainer to the transmission case in the same manner as the pinion bearing retainer (f above). Install a new oil seal in the retainer and line up the notch in the gaskets with the oil return hole of the transmission case, install the cap screws and tighten the retainer into position.

h. Install Speedometer Gear and Pinion and Brake Drum Assembly. Install the spacer on the speedometer drive gear and spacer on the main shaft. Assemble the universal joint flange to the brake drum with the four bolts and nuts and lock washers ($\frac{3}{4}$ ton, 4 x 4 truck). Install the flange or flange and drum assembly on the transmission main shaft. Install the plain washer and nut. Tighten the nut securely and install a new cotter pin. Install the speedometer pinion in place in the rear bearing retainer and tighten the pinion retaining nut.

i. Install Hand Brake Band Assembly ($\frac{3}{4}$ Ton, 4 x 4 Truck) (par. 78 k and l).

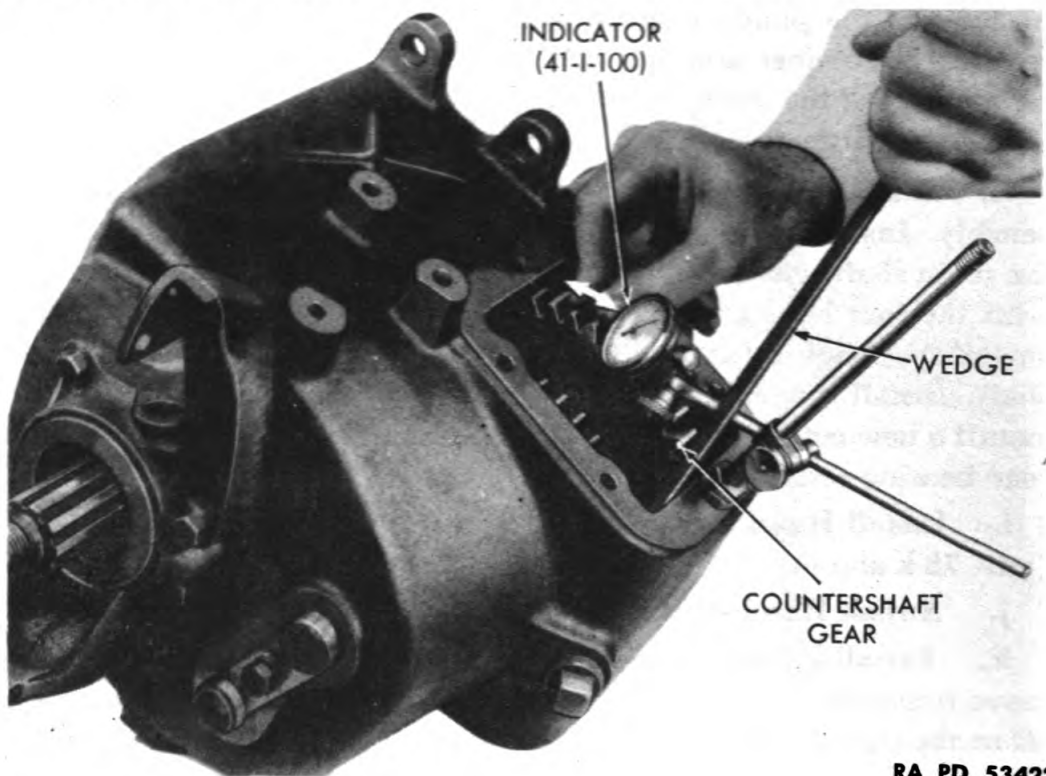
j. Adjust Hand Brake ($\frac{3}{4}$ Ton, 4 x 4 Truck) (par. 78 p).

k. Install Power Take-off (Vehicles with Winch) (fig. 12). Remove transmission from fixture and lay it on its side. Attach power take-off to the transmission with three 0.010-inch gaskets. Remove the cover from the right side of the transmission. Attach a dial indicator to the transmission case so that the indicator plunger contacts with one of the teeth of the countershaft gear that meshes with the power take-off idler gear. Insert a wedge between the power take-off case and the power take-off driven gear to hold the gear from turning. Move the transmission countershaft gear back and forth to determine the amount of backlash. Check in several positions of the gear mesh (fig. 12). The backlash must not be less than 0.003 inch or more than 0.008 inch. If the lash is less than 0.003 inch, add one 0.005-inch gasket and if greater than 0.008 inch remove or exchange gaskets with thinner gaskets to secure backlash within the specifications. Gaskets are available in thicknesses of 0.005 inch, 0.010 inch and 0.020 inch. Check the backlash after making alteration. Remove dial gage and install the cover on the right side of transmission with a new gasket.

l. Install Gearshift Lever Housing Assembly. Line up the main shaft gears so the gear shaft forks will slide into the grooves in the gears. Place the gearshift lever housing assembly, with a new gasket, over the transmission opening and install the attaching cap screws with lock washers.

m. Install Hand Brake Lever and Transfer Case Control. Place the hand brake lever and sector assembly in position on the transmission case. Then assemble the transfer case control bracket and lever assembly to the transmission case with the spacers. Connect the hand

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Figure 12—Checking Power Take-off Gear Backlash

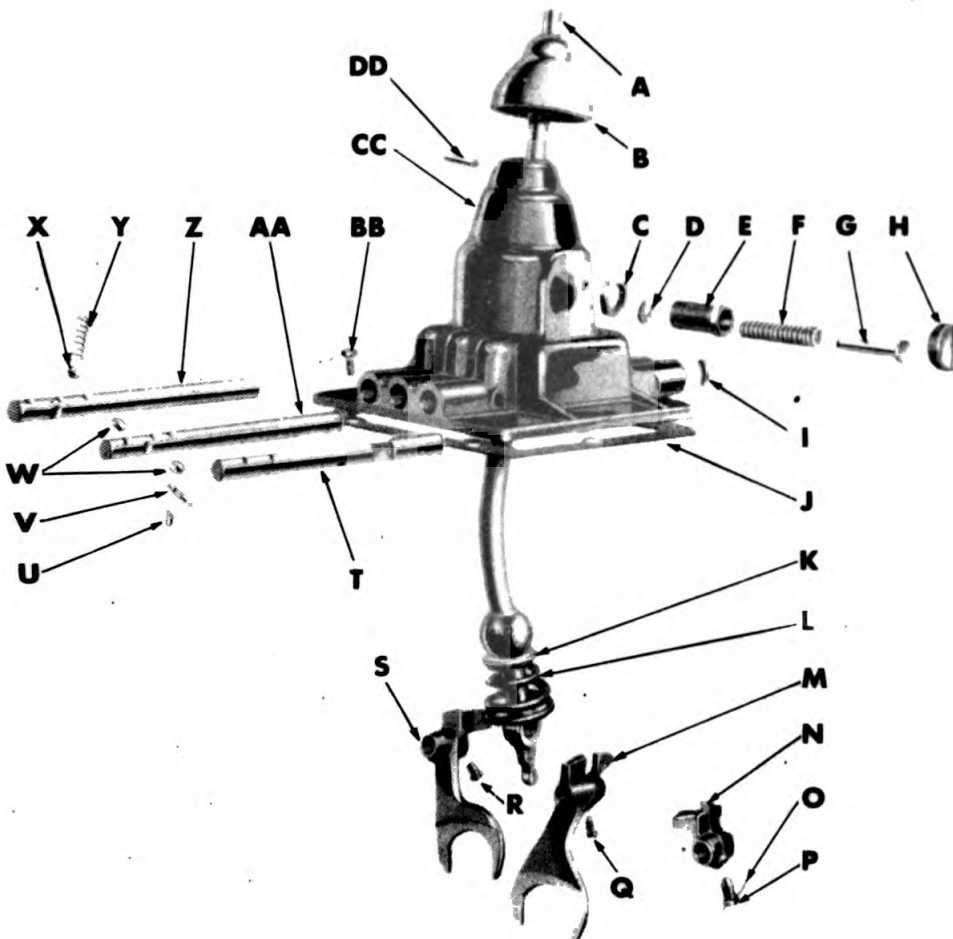
brake spacer to the sector and connect the hand brake rod at the transmission end on the $\frac{3}{4}$ -ton, 4 x 4 trucks.

17. DISASSEMBLY OF GEARSHIFT LEVER HOUSING.

a. **Remove Shift Rails.** Place the assembly in a vise in an inverted position with the shifting mechanism exposed. Remove the three wires that lock the gearshift fork lock screws in place and remove the screws. With shift rails in the neutral position and rag over poppet ball holes, push the center shift rail by hand toward the rear of the cover. Then drive out the rail and the expansion plug. Remove fork from the housing. Remove the reverse rail and rail end and the first and second speed rail and fork in the same manner. Then remove the poppet balls and springs and the interlock plungers located in the cover between the outside shift rails and the center rail.

b. **Remove and Disassemble Reverse Stop Assembly.** Unscrew and remove the reverse stop plug from the side of the gearshift lever housing. Remove the stop retainer check nut and then screw out the stop retainer. Push the reverse stop into the retainer and remove the horseshoe-shaped stop washer. Then remove stop and spring from the retainer.

TRANSMISSION AND POWER TAKE-OFF



- | | |
|---------------------------------------|--|
| A —GEARSHIFT LEVER | P —RAIL END LOCK SCREW |
| B —LEVER BALL DUST COVER | Q —SHIFT FORK LOCK SCREW |
| C —STOP RETAINER CHECK NUT | R —SHIFT FORK LOCK SCREW |
| D —REVERSE STOP WASHER | S —LOW AND SECOND SHIFT FORK |
| E —STOP RETAINER | T —REVERSE SHIFT RAIL |
| F —REVERSE STOP SPRING | U —INTERLOCK PIN STOP |
| G —REVERSE STOP | V —SHIFT RAIL INTERLOCK PIN |
| H —REVERSE STOP PLUG | W —SHIFT RAIL INTERLOCK PLUNGER |
| I —EXPANSION PLUG | X —POPPET BALL (3) |
| J —LEVER HOUSING GASKET | Y —POPPET BALL SPRING (3) |
| K —LEVER BALL FRICTION PLATE | Z —LOW AND SECOND SHIFT RAIL |
| L —GEARSHIFT LEVER SPRING | AA —THIRD AND DIRECT SHIFT RAIL |
| M —THIRD AND DIRECT SHIFT FORK | BB —SCREW AND LOCK WASHER |
| N —REVERSE SHIFT RAIL END | CC —GEARSHIFT LEVER HOUSING |
| O —LOCK WIRE | DD —LEVER GUIDE PIN |

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Figure 13—Gearshift Lever Housing Disassembled

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c. **Remove Gearshift Lever.** Unscrew and remove the gearshift lever knob from the lever. Screw the gearshift lever spring from the supports cast in the housing with 10-inch pliers. Then remove the lever.

**18. INSPECTION OF GEARSHIFT LEVER HOUSING
PARTS.**

a. **Inspect Shift Rails and Forks.** Examine the shift rails for distortion and excess wear at the indents. Examine the interlock of the third and direct shaft. This interlock prevents shifting of other gears when the transmission is shifted into reverse gear. Replace the rails if they are worn excessively or replace the interlock plunger if it is damaged or does not operate freely. Inspect the shift forks for excessive wear, cracks and misalignment.

b. **Inspect Plungers, Poppet Balls and Springs.** Replace poppet balls that are rough or damaged. Replace plungers that are rough or excessively worn and replace poppet ball springs that are broken, out of shape or excessively worn. The free length of the poppet ball springs is $1\frac{5}{16}$ inch. The pressure required to compress spring to $2\frac{1}{32}$ inch is 22 to 26 pounds. Replace springs that do not measure up to these specifications.

c. **Inspect Housing.** Inspect the housing for cracks and for any irregular condition of the casting and the machine surfaces. Replace if not satisfactory.

d. **Inspect Reverse Stop Parts.** Replace retainer or locking nut if the threads are not satisfactory. Replace the spring if it is broken or distorted. Replace the stop and stop washer if they are damaged.

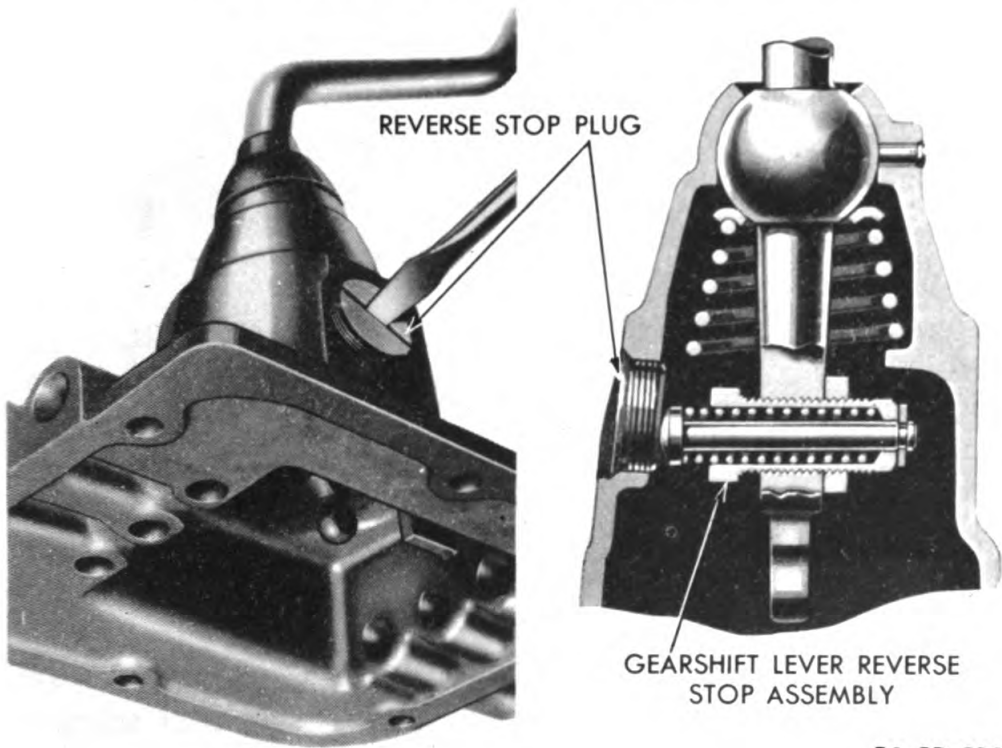
e. **Inspect Lever, Friction Plate and Spring.** Replace the friction plate if it is excessively worn. Replace the spring if it is broken or distorted. Replace the lever if the ball is worn or if the lever is out of line, broken, or the threads for the reverse stop are unsatisfactory.

f. **Inspect Dust Cover and Gearshift Knob.** Replace the dust cover if it is damaged or deteriorated. Replace the gearshift knob if it fits loosely on the lever.

19. ASSEMBLY OF GEARSHIFT LEVER HOUSING.

a. **Install Gearshift Lever and Reverse Stop (fig. 14).** Clamp the housing upside down in a vise. Insert the gearshift lever through case cover and install the lever ball friction plate with flanged side toward spring. Install gearshift lever spring by screwing it into position with 10-inch pliers under all the lugs in the cover. Assemble the reverse stop spring into its retainer and insert reverse stop. Compress the spring and

TRANSMISSION AND POWER TAKE-OFF



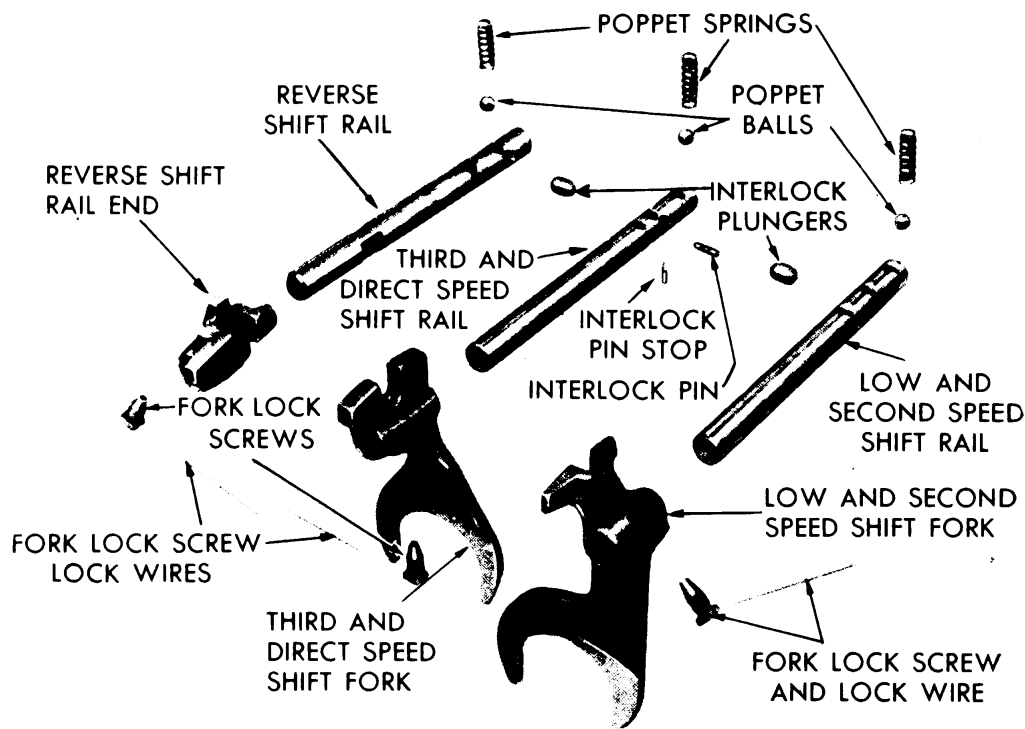
RA PD 53453

Figure 14—Gearshift Lever Reverse Stop Installation

lock the assembly with the stop washer. Screw the stop retainer into the gearshift lever far enough to center it in the lever. Install check nut on the stop retainer. Install reverse stop plug in housing. Then adjust the position of the assembly so that the large end of the reverse stop just contacts with the reverse stop plug when the gearshift lever is centered in the housing.

b. **Install Reverse Shift Rail** (fig. 15). The poppets are under considerable spring tension and care must be taken to prevent them from accidentally flying out of position. Insert the reverse shift rail (the rail with the milled notch for the reverse gearshift fork) into the rear of the cover and engage it with the reverse rail end. Position the rail so that the two indents for the poppet ball face toward the gearshift lever to bring them into proper relation with the poppet when the rail is completely installed. Push the rail in until it just engages with the rail hole in the front end of the housing. Then install the rail poppet spring and poppet and, with a screwdriver inserted in the shift rail hole at the front end of the housing, force the poppet into the recess and then drive the shift rail into neutral position (fig. 16). Position the reverse rail end so that the lock screw hole lines up with the one in the rail and insert the lock screw. Tighten the lock screw and lock it in place with a new lock

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Figure 15—Gearshift Forks and Rails Disassembled

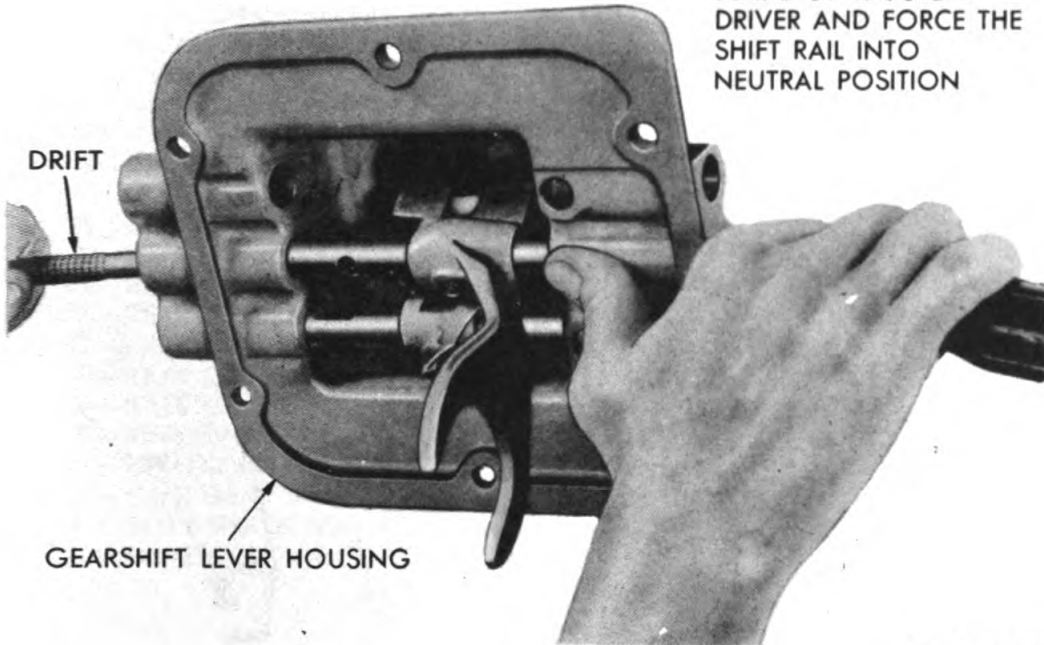
c. **Install Third and Direct Shift Rail** (fig. 15). Place the rail previously installed in neutral position to prevent damaging the interlock pin in the third and direct rail. Insert the rail interlock plunger in the drilled hole between the reverse shift rail and the third and direct shift rail. **Make sure the interlock pin and stop are assembled in the rail.** Insert the rail and engage it in the third and direct shift fork, with the bend in the fork toward the front end of the housing and lock screw hole toward rear of housing. Then push the shift rail through the housing until it just enters the hole in the front of the housing. Install the poppet spring and poppet and, with the aid of a screwdriver to hold the poppet in place, drive the shift rail into the neutral position (fig. 15). Position the shift fork on the rail and install the lock screw and tighten. Lock the screw in place with a new lock wire.

d. **Install Low and Second Shift Rail** (fig. 15). Install the interlock plunger between the third and direct and low and second rail holes. Then install the low and second shift rail in the same manner as the other rails. Lock the shift fork in place with the lock screw and lock wire.

e. **Install Expansion Plugs.** Install new expansion plugs in the

TRANSMISSION AND POWER TAKE-OFF

COMPRESS POPPET BALL
AND SPRING WITH THE
BLADE OF A SCREW-
DRIVER AND FORCE THE
SHIFT RAIL INTO
NEUTRAL POSITION



RA PD 53423

Figure 16—Installing Gearshift Rail

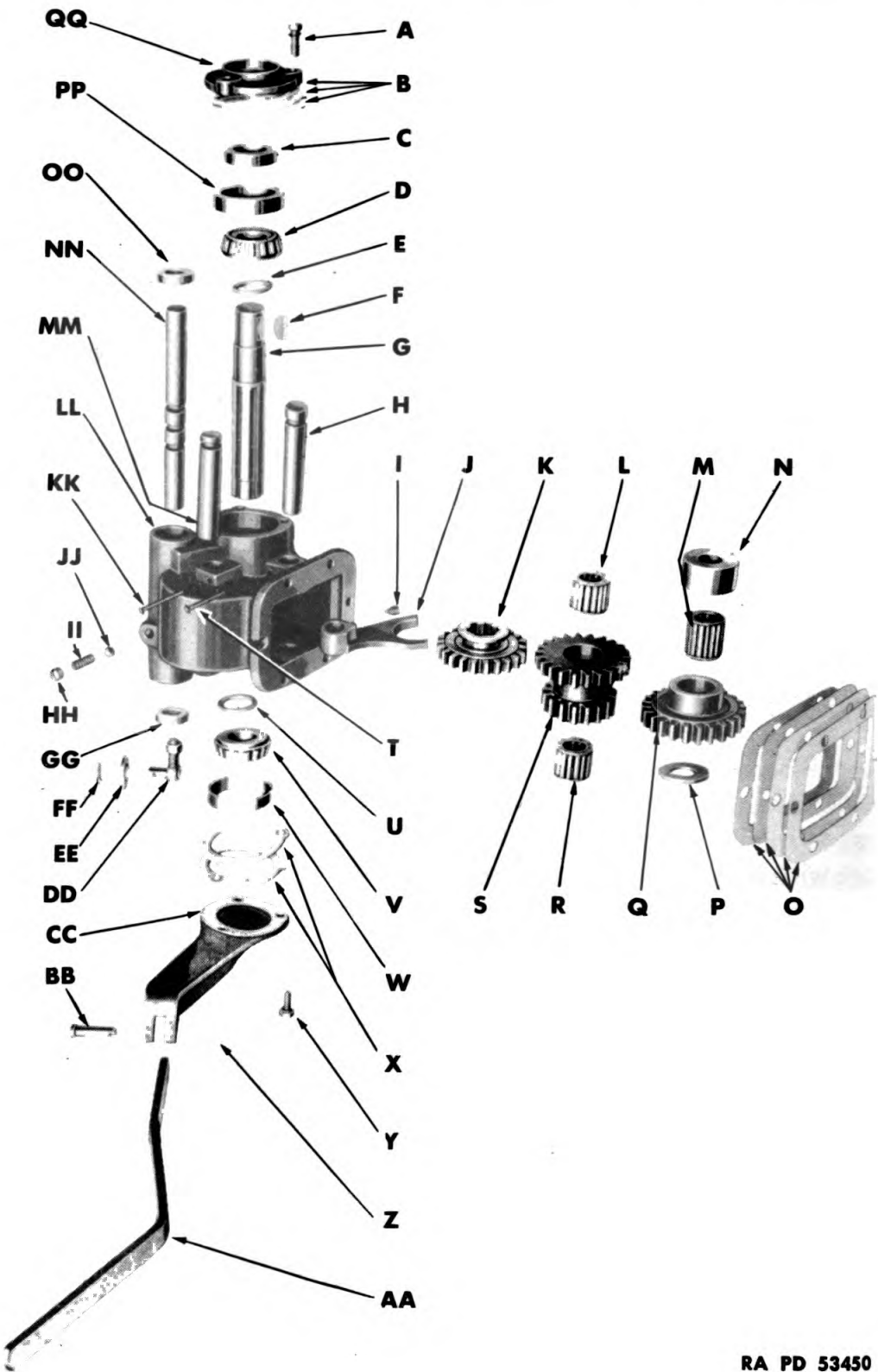
shift rail holes in the rear end of the housing. Examine the plugs before installing to be sure that they are clean and that the edges are not burred. Install the plugs with the convex face out and drive them in place with a punch of approximately the same diameter as the expansion plug.

20. DISASSEMBLY OF POWER TAKE-OFF.

a. **Remove Idler Gear and Reverse Idler Gear (fig. 17).** Cut off the rivets (T and KK, fig. 17), that lock the idler and reverse idler gear shafts in the power take-off housing. Drive the idler gear shaft out through the front of the housing and remove the idler gear spacer, roller bearing, idler gear and washer from the housing. Drive out the reverse idler gear shaft through the front of the housing and remove the reverse idler gear with the two roller bearings.

b. **Remove Shifter Shaft, Shifter Fork and Oil Seals (fig. 17).** Remove the shifter shaft ball spring pipe plug (HH, fig. 17) from the housing and remove the ball spring and ball. Remove the shifter fork set screw. Then drive the shifter shaft out through back end of housing and remove fork from housing. Drive the shifter shaft oil seals out of the housing.

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TRANSMISSION AND POWER TAKE-OFF

A —SCREW AND LOCK WASHER	W —DRIVE SHAFT BEARING CUP
B —END PLATE GASKET	X —END PLATE GASKET
C —DRIVE SHAFT OIL SEAL	Y —SCREW AND LOCK WASHERS
D —DRIVE SHAFT BEARING CONE	Z —CLEVIS PIN COTTER
E —DRIVE SHAFT WASHER	AA —POWER TAKE-OFF LEVER
F —KEY	BB —CLEVIS PIN
G —DRIVE SHAFT	CC —DRIVE SHAFT END PLATE
H —IDLER GEAR SHAFT	DD —EYE BOLT
I —SHIFTER FORK SET SCREW	EE —EYE BOLT WASHER
J —SHIFTER FORK	FF —EYE BOLT PIN COTTER
K —SLIDING GEAR	GG —SHIFTER SHAFT OIL SEAL
L —REVERSE IDLER GEAR BEARING	HH —PIPE PLUG
M —IDLER GEAR BEARING	II —SHIFTER SHAFT BALL SPRING
N —IDLER GEAR SPACER	JJ —SHIFTER SHAFT BALL
O —MOUNTING GASKETS	KK —GEAR SHAFT RIVET
P —IDLER GEAR WASHER	LL —HOUSING
Q —IDLER GEAR	MM —REVERSE IDLER GEAR SHAFT
R —REVERSE IDLER GEAR BEARING	NN —SHIFTER SHAFT
S —REVERSE IDLER GEAR	OO —SHIFTER SHAFT OIL SEAL
T —IDLER GEAR SHAFT RIVET	PP —DRIVE SHAFT BEARING CUP
U —DRIVE SHAFT WASHER	QQ —OIL SEAL RETAINER PLATE
V —DRIVE SHAFT BEARING CONE	

RA PD 53450-B

Legend for Figure 17—Power Take-off Disassembled

c. **Remove Drive Shaft and Sliding Gear** (fig. 17). Remove the attaching cap screws from the end plate (CC, fig. 17) and remove the end plate carefully so the paper gaskets will not be damaged. Remove the screws from the oil seal retainer plate (QQ, fig. 17) and drive on the open or splined end of the shaft until the shaft is removed from the bearing. Then pull the shaft and oil seal retainer assembly from the housing. Remove the drive shaft roller bearing, bearing washer and sliding gear from housing.

d. **Remove Oil Seal and Bearing from Drive Shaft** (fig. 17). Remove the key (F, fig. 17) from the drive shaft. Place a piece of shim stock over the keyway and remove the oil seal and plate. Drive the main shaft out of the bearing and washer. Remove the oil seal from the oil retainer plate.

e. **Remove Main Shaft Bearing Cups.** Drive the main shaft bearing cups out of the housing.

21. INSPECTION OF POWER TAKE-OFF PARTS.

a. **Clean Parts.** Wash all parts except oil seals in dry-cleaning solvent, and dry with compressed air.

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b. **Inspect Gears** (fig. 17). Carefully examine all gears for cracks, broken and scored or excessively worn teeth. Check fit of sliding gear on drive shaft and for excess wear at shifter fork collar.

c. **Inspect Roller Bearings and Cups** (fig. 17). Inspect the roller bearings for cracked or rough rollers and excessive wear. Examine them for discoloration due to overheating and for proper fit of the rollers in the cages. Replace the roller bearings if they fit so loose on the drive shaft that they turn on the shaft. Check the roller bearing cups for cracks, scores, discoloration due to excess heating and for excess wear.

d. **Inspect Drive Shaft, Gear Shafts, and Shifter Shafts** (fig. 17). Inspect the gear shafts and shifter shaft for wear and straightness. Inspect the fit of the roller bearing on the drive shaft and replace the shaft if it is worn so the bearings are not a tight fit. Make sure the grooves, where the lock ball fits into the shifter shaft, are not excessively worn, as this will allow the sliding gear to move out of place. Check the eyebolt and the end of the shifter shaft for stripped or loose threads, scoring or wearing of the pin, causing excessive looseness of the pin in the eyebolt.

e. **Inspect Shifter Shaft Lock Ball and Spring** (fig. 17). Replace the shifter shaft ball if it is cracked, worn or out of shape. The spring free length is $1\frac{5}{16}$ inch. When compressed to 20 to 26 pounds pressure the length should be $2\frac{1}{32}$ inch. Replace the spring if it is worn, compressed or stretched out of shape.

f. **Inspect Housing and Plates** (fig. 17). Inspect the housing for cracks or other irregular conditions of the casting and machined surfaces that would cause leakage or misfitting of the parts. Examine the end plate and oil seal retainer plate and replace parts if cracked or damaged.

g. **Inspect Shifter Fork** (fig. 17). Replace the shifter fork if it is worn or damaged. If the fork is only slightly bent, it may be straightened.

h. **Replace Oil Seals**. Replace oil seals whenever the power take-off is disassembled for repairs.

22. ASSEMBLY OF POWER TAKE-OFF.

a. **Condition Oil Seals** (fig. 17). Soak the new oil seals in luke-warm oil and roll the edges of the seals with a smooth round bar to soften the seals and make them flexible.

b. **Install Shifter Shaft and Fork** (fig. 17). Install new oil seals in the housing at each end of the shifter shaft bore, with sealing edge of the

TRANSMISSION AND POWER TAKE-OFF

oil seals facing toward the inside of the housing. Insert the shaft carefully through the rear end seal and install the shifter fork on the shaft with the lock screw side of the fork toward the front of housing. Then carefully push the shaft through the front oil seal and install the lock ball, spring and lock plug. Tighten the shifter fork in position with a socket head set screw wrench.

c. Install Drive Shaft and Sliding Gear (fig. 17). Install the bearing washer on the keyway end of the drive shaft and press the bearing on the shaft with the large end of the bearing toward the splined end. Install a new oil seal in the oil seal retainer plate with the sealing edge facing toward the inside of the housing. Insert the drive shaft and bearing through the front end opening of the housing and install the sliding gear on the shaft with the shift gear collar towards the shaft keyway. Install the bearing washer on the splined end of the drive shaft and place the bearing on the shaft with the small end facing the rear end opening of the housing. Drive the bearing on the drive shaft until the bearing washer is firmly seated against the shoulder of the shaft.

d. Install Drive Shaft Bearing Cups and Retainers. Drive the bearing cup into the housing end plate opening until it is approximately flush with the housing. Drive the bearing cup into the housing oil retainer plate opening until it is tight against the bearing. Place a smooth piece of shim stock over the shaft keyway to protect the oil washer and slide the oil washer retainer plate gaskets and retainer plate over the shaft. Attach the retainer plate to the housing with cap screws and lock washers. Assemble the gaskets between the end plate and housing and install the end plate.

e. Check Drive Shaft Bearing Adjustment (fig. 17). Tap on each end of the drive shaft while tightening the end plate and oil retainer plate, so the bearings and cups will be firmly seated. Rotate and pull the shaft by hand to determine if it rolls freely and whether or not the end play is excessive. Remove gaskets from either the end plate or oil retainer plate to tighten the bearings and reduce end play. Install gaskets at either end to loosen the bearings. There should be no appreciable end play and the drive shaft should roll freely when the bearings are properly adjusted. The gaskets used for installation of the end plate and retainer plate are supplied in 0.010-inch and 0.020-inch thickness. When the adjustment is satisfactory, install the key in the drive shaft keyway.

f. Install Reverse Idler Gear and Idler Gear (fig. 17). Insert the two roller bearings in the ends of the reverse idler gear and hold the

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gear assembly so the gear is lined up with the shaft openings in the housing. Then drive the shaft through the housing and gear bearings and lock in place with a new rivet. Insert the roller bearing in the idler gear. Insert the idler gear shaft through the rear opening of the housing and install the thin washer on the shaft. Install the gear and bearing assembly and then the thick spacer on the shaft. Drive the shaft through the housing front opening and lock in place with a new rivet.

23. INSTALLATION OF TRANSMISSION ASSEMBLY.

a. **Install Transmission.** Guide the transmission main drive pinion straight through the clutch release bearing and disk hub splines into the crankshaft bushing in the end of the crankshaft. Move the transmission into place on pilot studs (par. 13 i) and install the lower transmission cap screws with lock washers. Remove the two pilot studs and install the upper cap screws and lock washers.

b. **Connect Intermediate Propeller Shaft.** Slide the universal joint sliding yoke on the intermediate propeller shaft to engage the universal joint with the transmission companion flange. Install the clamps on the universal joint and install the bolts with bolt locks. Install new nut locks on the bolts and install the nuts. Tighten the nuts securely. Bend over the lugs of all the clamp bolt and nut locks.

c. **Attach Intermediate Frame Cross Member (except on Ambulance).** Move the cross member into position and insert the four small bolts which attach the cross member to the upper flanges of the frame side rails. Install lock washers and nuts but do not tighten the nuts. Assemble the rear cross member to frame gusset to the cross member with two of the large cap screws with lock washers, also the two large cap screws with lock washers to attach the cross member to the front gusset. Install the two rear gussets to frame side rail bolts and nuts with lock washers; also the two large bolts and nuts with lock washers, attaching the cross member to the right frame side rail. Tighten all bolts and nuts securely.

d. **Connect Transfer Case Control Rods, Hand Brake Cable and Speedometer Cable.** Connect the transfer case control rods at the transmission end. Connect both ends of the hand brake on 1½ ton, 6 x 6 truck. Connect the speedometer cable and housing to the transmission on $\frac{3}{4}$ ton, 4 x 4 truck.

e. **Connect Winch Drive Shaft (if so equipped).** Make sure the power take-off drive shaft key is in place. Slide the drive shaft joint assembly onto the power take-off drive shaft. Tighten set screw which holds the universal joint assembly on the power take-off drive shaft. Place a new wire through the head of the set screw and lock it around

TRANSMISSION AND POWER TAKE-OFF

the joint. Set the drive collar $\frac{1}{2}$ inch ahead of the splined yoke and tighten the set screw. Place a new wire through the head of the set screw and lock it around the collar.

f. Fill Transmission with Lubricant. Remove the transmission filler plug and fill the transmission $\frac{1}{2}$ inch below the filler hole with lubricant at room temperature. Use $7\frac{1}{2}$ pints if vehicle is equipped with power take-off and 6 pints without power take-off. Install filler plug.

g. Install Floor Center Panel and Plates. Lower the center floor panel into position over gearshift lever, hand brake and transfer case levers. If vehicle is equipped with a power take-off, slide the end of the power take-off control lever up through the opening in the center floor panel and hold it in position. Lift up the floor panel and install the end plate clevis pin and cotter pin at the shifter lever end plate, also the cotter pin with plain washer in the shifter shaft eyebolt pin. Install the panel cap screws with toothed lock washers and tighten. Install the pin and cotter pin which attach the accelerator pedal to the accelerator pedal rod. Lay the right floor plate in place and install the screws with toothed lock washers. Connect the throttle control spring to the clip on the accelerator shaft to throttle bell crank rod. Lay the left floor plate in place and install the screws with toothed lock washers. Install the clutch and brake pedal draft pads and pad retainers. Tighten all the screws securely.

h. Install Spare Wheel and Tire Assembly (except Ambulance). Place the wheel and tire assembly on the carrier and install the carrier plate and nut. Tighten the nut securely and install the lock.

i. Install Floor Mat (Ambulance only). Place the rear section of the floor mat in position and install the screws with plain washers. Place the center and two end linoleum retainers in position and install the screws. Work the front section of the floor mat into place so that the openings in the mat will slide down over the gearshift, hand brake and transfer case levers and the accelerator pedal. Install the pin and cotter pin to attach the accelerator pedal to the accelerator pedal rod. Install mat screws with plain washers and tighten. Place driver's seat in position and, with the seat raised to its highest position, install seat adjusting mechanism to floor cap screws with lock washers. Install the one short cap screw in the right rear screw hole of the seat adjusting mechanism. Place the attendant's seat in position and tilt it forward. Install the seat support bracket cap screws with lock washers.

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CHAPTER 2

POWER TRAIN (Cont'd)

Section IV

TRANSFER CASE ($\frac{3}{4}$ TON, 4 x 4 TRUCK)

	Paragraph
Description of construction	24
Removal of transfer case assembly	25
Disassembly of transfer case	26
Inspection of transfer case parts	27
Assembly of transfer case	28
Installation of transfer case assembly	29

24. DESCRIPTION OF CONSTRUCTION.

a. The shafts of the transfer case (fig. 18) are carried on tapered roller bearings. The bearings are adjustable by removing or installing shims between the bearing retainer and the case. The driven gear slides on a splined driven shaft to engage or disengage front axle drive. Rear wheel drive is in constant engagement through the transfer case.

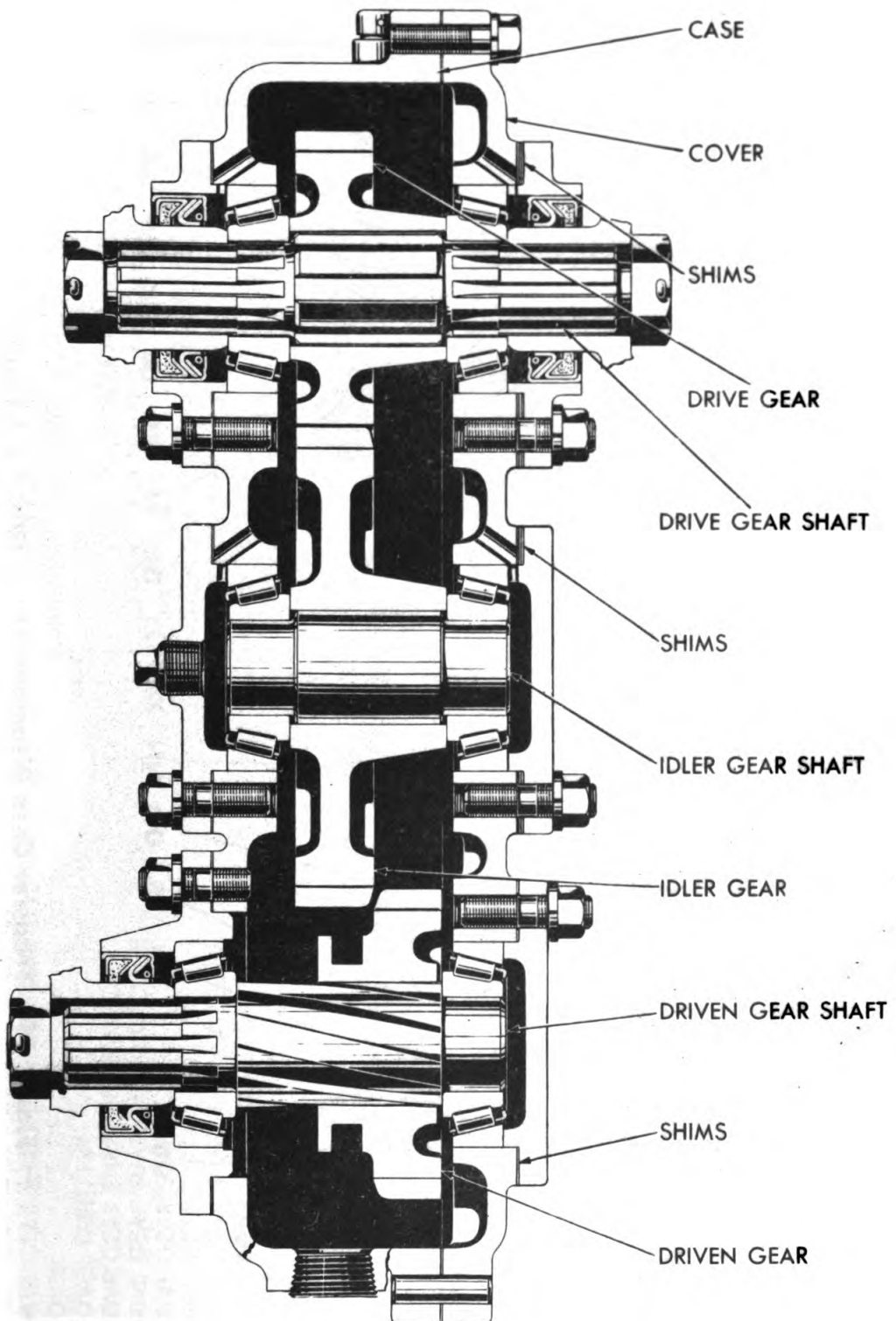
25. REMOVAL OF TRANSFER CASE ASSEMBLY.

a. **Drain Lubricant.** Place a drain pan under the transfer case and drain the lubricant.

b. **Disconnect Propeller Shafts and Control Rod.** Open the universal joint clamp bolt nut locks on the propeller shaft sliding yokes. Remove the nuts from the universal joint clamp bolts. Remove the bolts and locks, then the universal joint clamps, and move the yokes on the propeller shafts away from the universal joints. Remove cotter pin from the transfer case control rod at the transfer case and the cotter pin and clevis pin from the control lever end of the control rod.

c. **Remove Transfer Case.** Remove the lock wires from the four cap screws which attach the transfer case to the mounting brackets. Support the transfer case with a jack to prevent personal injury. Remove the four cap screws which hold the transfer case to mounting bracket and remove the transfer case assembly from under the vehicle.

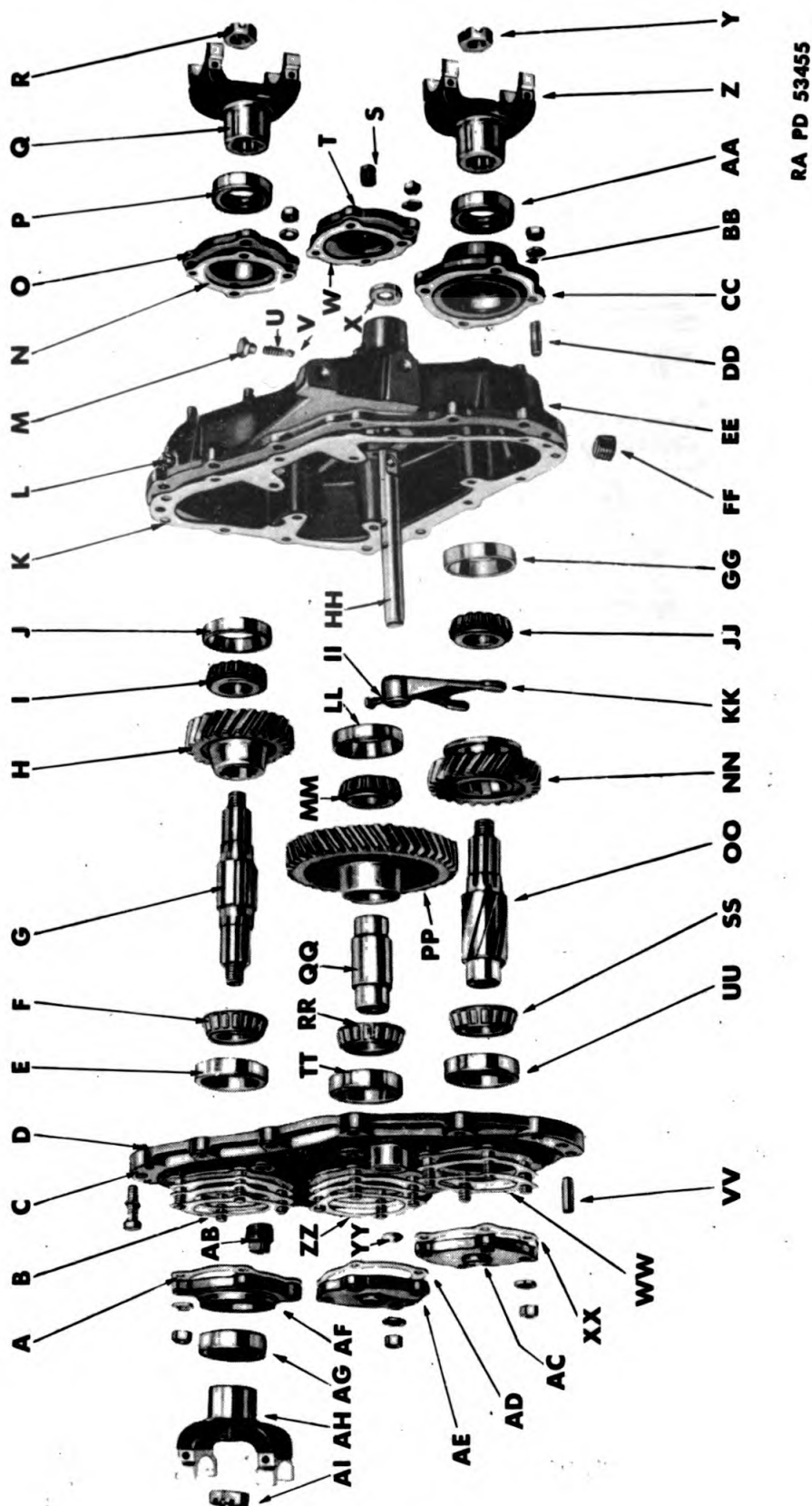
TRANSFER CASE ($\frac{3}{4}$ TON, 4 x 4 TRUCK)



RA PD 53454

Figure 18—Transfer Case ($\frac{3}{4}$ Ton, 4 x 4 Truck)

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FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)**



RA PD 53455

Figure 19—Transfer Case Disassembled ($\frac{3}{4}$ Ton, 4 x 4 Truck)

TRANSFER CASE (½ TON, 4 x 4 TRUCK)

A —DRIVE GEAR SHAFT BEARING RETAINER GASKET	EE —CASE
B —DRIVE GEAR SHAFT BEARING RETAINER SHIMS	FF —DRAIN PLUG
C —COVER	GG —DRIVEN GEAR SHAFT BEARING CUP
D —COVER TAPER PIN	HH —SHIFT RAIL
E —DRIVE GEAR SHAFT BEARING CUP	II —SHIFT FORK LOCK SCREW AND LOCK WIRE
F —DRIVE GEAR SHAFT BEARING CONE	JJ —DRIVEN GEAR SHAFT BEARING CONE
G —DRIVE GEAR SHAFT	KK —SHIFT FORK
H —DRIVE GEAR	LL —IDLER GEAR SHAFT BEARING CUP
I —DRIVE GEAR SHAFT BEARING CONE	MM —IDLER GEAR SHAFT BEARING CONE
J —DRIVE GEAR SHAFT BEARING CUP	NN —DRIVEN GEAR
K —COVER GASKET	OO —DRIVEN GEAR SHAFT
L —VENT NIPPLE	PP —IDLER GEAR
M —SHIFT RAIL POPPET SCREW	QQ —IDLER GEAR SHAFT
N —DRIVE GEAR SHAFT BEARING RETAINER GASKET	RR —IDLER GEAR SHAFT BEARING CONE
O —DRIVE GEAR SHAFT BEARING RETAINER	SS —DRIVEN GEAR SHAFT BEARING CONE
P —DRIVE GEAR BEARING OIL SEAL	TT —IDLER GEAR SHAFT BEARING CUP
Q —PROPELLER SHAFT COMPANION FLANGE	UU —DRIVEN GEAR SHAFT BEARING CUP
R —COMPANION FLANGE NUT	VV —COVER TAPER PIN
S —IDLER GEAR END-PLAY CHECKING PLUG	WW —DRIVEN GEAR SHAFT BEARING RETAINER SHIMS
T —IDLER GEAR SHAFT BEARING RETAINER—FRONT	XX —DRIVEN GEAR SHAFT BEARING RETAINER GASKET
U —SHIFT RAIL POPPET BALL SPRING	YY —SHIFT RAIL EXPANSION PLUG
V —SHIFT RAIL POPPET BALL	ZZ —IDLER GEAR SHAFT BEARING RETAINER SHIMS
W —IDLER GEAR SHAFT BEARING RETAINER GASKET	AB —FILLER PLUG
X —SHIFT RAIL OIL SEAL	AC —DRIVEN GEAR SHAFT BEARING RETAINER—REAR
Y —COMPANION FLANGE NUT	AD —IDLER GEAR SHAFT BEARING RETAINER GASKET
Z —PROPELLER SHAFT COMPANION FLANGE	AE —IDLER GEAR SHAFT BEARING RETAINER—REAR
AA —DRIVEN GEAR BEARING OIL SEAL	AF —DRIVE GEAR SHAFT BEARING RETAINER
BB —DRIVEN GEAR SHAFT BEARING RETAINER—FRONT	AG —DRIVE GEAR BEARING OIL SEAL
CC —DRIVEN GEAR SHAFT BEARING RETAINER GASKET	AH —PROPELLER SHAFT COMPANION FLANGE
DD —BEARING RETAINER STUD—SHORT	AI —COMPANION FLANGE NUT

RA PD 53455-B

Legend for Figure 19—Transfer Case Disassembled (½ Ton, 4 x 4 Truck)

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)****26. DISASSEMBLY OF TRANSFER CASE.**

a. **Clean Transfer Case.** Wash the exterior of the transfer case with dry-cleaning solvent, and dry with compressed air.

b. **Remove Transfer Case Cover** (fig. 19). Remove the cotter pins that lock the three companion flange nuts in place and remove the nuts and flanges. Drive out the cover taper pins (VV, fig. 19) and remove the transfer case cover cap screws to separate the cover from the case and remove the gasket. *Never pry the cover and case apart as this method would damage the parting faces.*

c. **Remove and Disassemble Shift Rail Assembly and Driven Gear** (fig. 19). Remove the shift rail poppet screw, spring and ball (V, fig. 19). Then remove the shift rail and fork together with the driven gear and shaft assembly. Press the bearings off the driven gear shaft carefully so the driven gear will not be damaged and remove the gear. Remove the lock wire from the shift rail fork screw. Loosen the screw and remove the fork.

d. **Remove Drive Gear and Idler Gear** (fig. 19). Lift the drive gear, shaft and bearings and the idler gear, shaft and bearings from the transfer case. Press the bearings from the shaft and remove the gears.

e. **Remove Bearing Cups** (fig. 19). Remove the nuts from the transfer case bearing retainer studs and remove the retainers and gaskets. Then press the bearing cups out of the case and press the driven gear shaft bearing cup out of the retainer. Remove the nuts from the transfer case cover bearing retainer studs. Remove the retainers and gaskets and retainer shims. The shims used between the cover and the cover bearing retainers are for the adjustment of the bearings. Retain the shims for assembly with the bearing retainer with which they were originally used. Press the bearing cups out of the case cover.

f. **Remove Oil Seals** (fig. 19). Pry the shift rail oil washer from the case to remove it. Drift the oil seals out of the bearing retainers.

27. INSPECTION OF TRANSFER CASE PARTS.

a. **Clean Parts.** Wash all parts except oil seals in dry-cleaning solvent, and dry with compressed air.

b. **Inspect Gears** (fig. 19). Examine all gears for cracks, or broken, scored and excessively worn teeth. Check the fit of the drive gear and driven gears on their shafts. Check the driven gear for excess wear at the shifter fork collar. Replace gears that are worn or damaged.

TRANSFER CASE ($\frac{1}{2}$ TON, 4 x 4 TRUCK)

c. **Inspect Bearings and Cups** (fig. 19). Replace any of the bearings or cups that are rough or worn excessively, cracked or discolored due to overheating. If the bearings or cups are in good condition and only slightly worn, adjust the bearings.

d. **Inspect Gear Shafts and Shifter Shafts** (fig. 19). Inspect the gear shafts and shifter shaft for misalignment and excessive wear. Check the grooves in the shifter shaft for the lock ball and replace shaft if the grooves are worn so the shaft will not hold the driven gear in place. The tapered roller bearings are a press fit on the shafts. Inspect the bearings for fit and replace any that are a loose fit. Try the fit of the gears on the splines of the drive shaft and the driven shaft and replace shafts or gears that are excessively worn.

e. **Inspect Shifter Shaft Lock Balls and Springs** (fig. 19). Replace the shifter shaft balls if cracked or worn. Replace the springs if worn, compressed or stretched out of shape.

f. **Inspect Case and Cover** (fig. 19). Inspect the case and cover for cracks or irregular machined surfaces that would cause leakage or misfitting of the parts. The case and cover attaching flange surfaces are machined together and both parts must be replaced as a matched set. Check the retainers for cracks and for proper fitting on the case and cover. Replace all parts that are not satisfactory.

g. **Inspect Gaskets and Shims** (fig. 19). Replace all shims that are broken or damaged. The shims between the bearing retainers and case cover are available in 0.005-inch, 0.010-inch and 0.012-inch thickness. Replace the retainer gaskets and the cover gasket to avoid oil leakage. Use a genuine Dodge gasket between the case cover and case as a different thickness gasket will change the bearing adjustment.

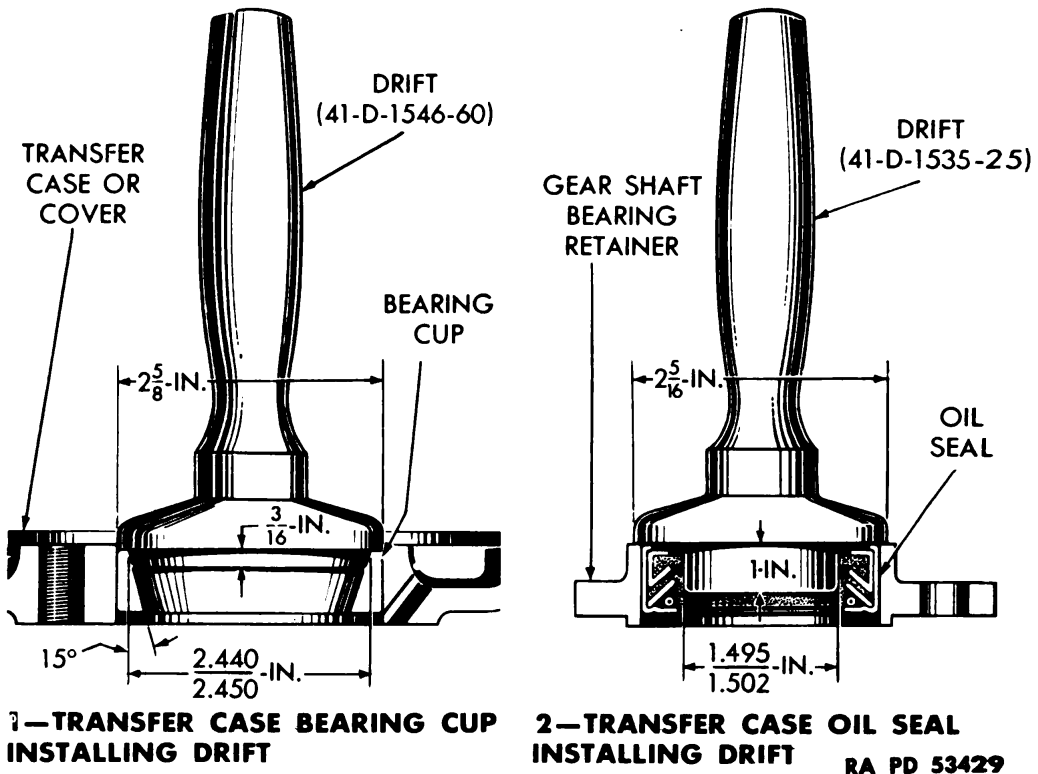
h. **Inspect Oil Seals and Flanges** (fig. 19). Inspect oil seals for wear or damage. Replace oil seals that appear unsatisfactory to avoid leakage of lubricant. Inspect the propeller shaft companion flanges for roughness or wear of the surface that contacts the oil seals. Replace flanges that are rough or worn to avoid rapid wear of the oil seals. Also check the flanges for cracks or loose fit on the shafts.

i. **Inspect Vent** (fig. 19). Inspect the vent nipple (L, fig. 19) on the top side of the case and make sure it is open to avoid pressure build-up and loss of lubricant through the oil seals.

28. ASSEMBLY OF TRANSFER CASE.

a. **Assemble and Install Driven Gear Retainer** (fig. 20). Drift the bearing cup into the driven gear retainer (1, fig. 20). Install the assembled retainer to the case with a new gasket.

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**Figure 20—Transfer Case Bearing Cup and
Oil Seal Installation**

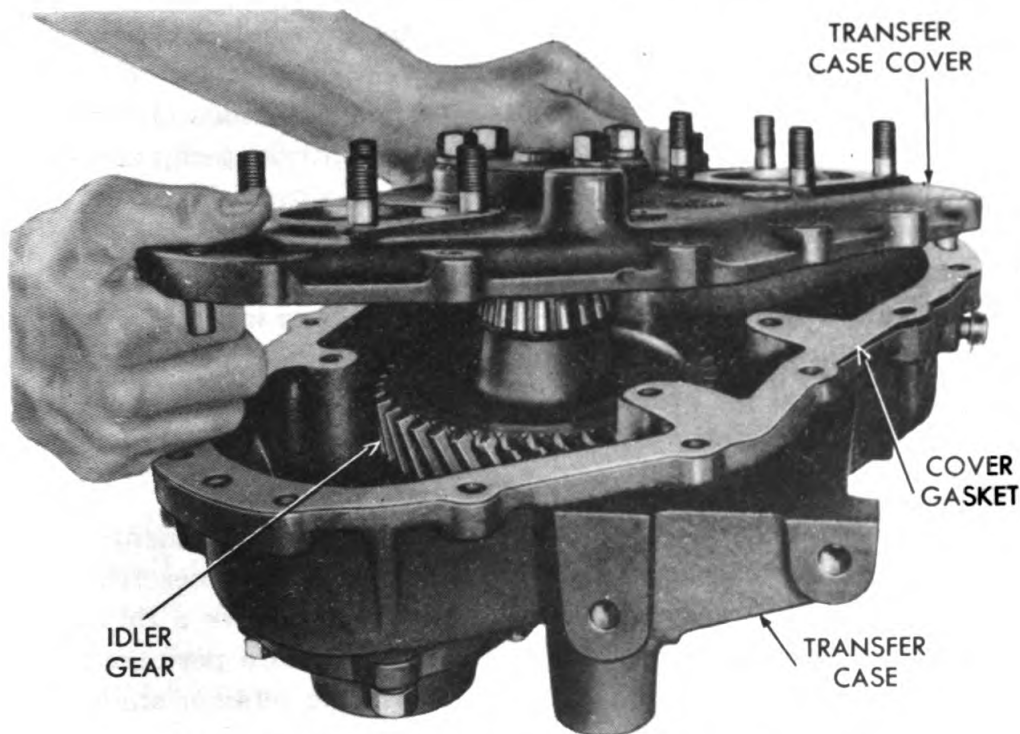
b. **Install Idler Gear Shaft and Drive Shaft Bearing Cups and Retainers** (fig. 20). Install the idler gear shaft and drive shaft bearing cups (1, fig. 20) in the case and install the caps on the case.

c. **Install Bearing Cups and Retainers in Cover** (fig. 20). Install the three bearing cups in the case cover (1, fig. 20). Install the three bearing retainers on the cover with their original shims or replacement shims of the same thickness and with new paper gaskets.

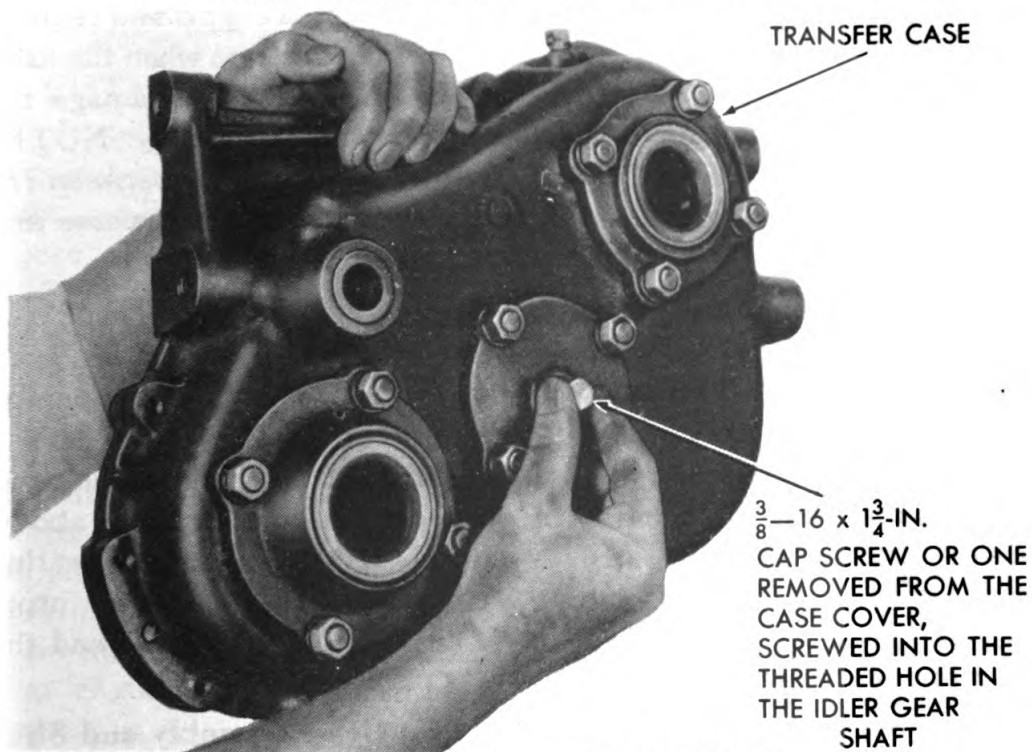
d. **Assemble Gears and Bearings on Shafts.** Press one of the shaft bearing cone and rollers on the case cover end of the shafts. Install the gear on the drive shaft with the long side of the gear hub towards the bearing just installed. Then press a bearing cone and roller on the opposite end of the drive shaft. Install the idler gear on the idler gear shaft with the long side of the gear hub toward the bearing and press a bearing cone and roller on the opposite end of the idler gear shaft. Press a bearing cone and roller on the driven gear shaft opposite to the splined end.

e. **Assemble Idler Gear Shaft and Bearings to Check Bearing Adjustment** (fig. 21). Install the idler gear, shaft and bearing assembly in the case and leave the other gears out (1, fig. 21). Install the idler

TRANSFER CASE ($\frac{1}{2}$ TON, 4 x 4 TRUCK)



1—ASSEMBLING IDLER GEAR TO CHECK END-PLAY



2—CHECKING IDLER GEAR END-PLAY

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Figure 21—Checking Transfer Case Idler Bearing Adjustment

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gear assembly so that the short section of the gear hub is towards the case and the long section towards the cover. Place a new cover gasket in position and install the transfer case cover assembly. Install the cap screws with lock washers and taper pins, with long cap screws in center holes of cover and tighten the cap screws to 35 foot-pounds of torque with foot-pound torque wrench (41-W-3630). Remove the pipe plug from the idler gear bearing retainer, which is attached to the transfer case, and install a $\frac{3}{8}$ x 16 x $1\frac{3}{4}$ inch cap screw into the threaded hole in the idler gear shaft. Grasp the cap screw and try to move the shaft forward and backward to determine if there is any end play (2, fig. 21) and spin the idler gear to determine if it is free rolling. The bearings should be free rolling with no end play.

f. Adjust Idler Gear Shaft Bearings. If an adjustment of the bearings is found necessary, remove the bearing retainer from the cover. Check the shims with a micrometer and remove a thin shim. Then replace the bearing retainer and tighten it into position by installing the lock washers and nuts on the bearing retainer studs. Remove or install shims until the bearings are free rolling, with no end play. Then remove the cap screw from the idler gear shaft and replace the plug in the bearing retainer. Drive out the dowel pins and remove the cover cap screws to separate the cover from the case when the idler gear bearings are properly adjusted. Be careful not to damage the cover gasket. Then remove the idler gear and shaft assembly. **NOTE:** *Do not attempt to adjust the bearings by inserting shims between the bearing retainer and the case. The gasket used between the case and retainer locates the gears for proper mesh with the other gears.*

g. Adjust Driving and Driven Gear Shaft Bearings. Install the drive and driven gears with their shafts and bearings in the case. Attach the case cover securely. Install the universal joint companion flanges and nuts and tighten nuts as tight as for final assembly. Check the gear and shaft assemblies for free rolling and end play. If the bearings require adjustment, follow the procedure outlined in step f above. Be sure to make the adjustment by changing shims between the bearing retainer and the cover assembly. When the bearings have been properly adjusted, remove the companion flanges, cover assembly and the gear and shaft assemblies.

h. Install Oil Seals (fig. 20), Driven Gear Assembly and Shift Fork (fig. 19). Drive new oil seals in bearing retainers, with the lip of the seal facing the inside of the cover or case, with an oil seal drift (41-D-1535-25), until seal retainer is just flush with the top of bearing retainer. Slide the driven gearshift fork on the gearshift rail so that

TRANSFER CASE ($\frac{3}{4}$ TON, 4 x 4 TRUCK)

the flat side of the fork will be towards the control rod hole in the end of the rail. Install the lock screw and tighten the screw. Insert a new lock wire through the hole in the screw, then wind around the rail and wind the ends together. Lubricate the driven gear bearings. Then assemble the fork assembly and driven gear and shaft assembly in the case. Install the rail and gear so that the flange of the gear will be towards the case. Install the poppet ball, spring and screw and tighten the screw.

i. **Install Idler Gear and Driving Gear Shaft Assemblies** (fig. 19). Lubricate the idler gear shaft bearings. Install the idler gear shaft assembly in the case, with the long section of the gear hub extended towards the transfer case cover. Then lubricate the drive gear shaft bearings and install the shaft assembly in the case, with long section of this gear hub also extended towards the cover.

j. **Install Cover and Companion Flanges** (fig. 19). Assemble the case cover to the case, with the gasket in place. Install the cap screws with lock washers and taper pins and tighten cap screws to 35 foot-pounds of torque with foot-pound torque wrench (41-W-3630). Use the five longer cap screws to fasten the center of the cover. Install the propeller shaft companion flanges on the shafts. Install and tighten the flange nuts securely and install cotter pins.

29. INSTALLATION OF TRANSFER CASE ASSEMBLY.

a. **Install Transfer Case.** Place the transfer case under the vehicle and raise it into position with jack. Install the transfer case to frame bracket, cap screws and lock washers. Lock the screws in place with new lock wire.

b. **Connect Propeller Shafts and Control Rod.** Place the universal joint sliding yokes in position and install the clamps, locks, and bolts. Then install new clamp bolt nut locks on the bolts, install the nuts and tighten securely. Bend over the lugs of all the clamp bolt and nut locks. Insert the control rod end in the shift rail and install the cotter pin. Install the clevis pin to connect the control rod to the control lever. If the control lever strikes the ends of the lever opening in the floor panel, adjust the control rod by loosening the rod lock nut, remove the clevis pin from the yoke at the control lever and turn the yoke on the control rod clockwise to shorten the rod or counterclockwise to lengthen the rod. Install clevis pin and cotter pin and tighten lock nut.

c. **Fill Transfer Case with Lubricant.** Remove the filler plug and fill with lubricant until lubricant is $\frac{1}{2}$ inch below filler opening, with transfer case and lubricant at room temperature (70° F.). Do not over-fill, as this will cause overheating and leakage of lubricant.

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
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CHAPTER 2

POWER TRAIN (Cont'd)

Section V

TRANSFER CASE (1½ TON, 6 x 6 TRUCK)

	Paragraph
Description of construction	30
Removal of transfer case assembly	31
Disassembly of transfer case	32
Inspection of transfer case parts	33
Assembly of transfer case	34
Installation of transfer case assembly	35

30. DESCRIPTION OF CONSTRUCTION.

a. The shafts of the transfer case (fig. 22) are carried by tapered roller and ball bearings. The roller bearing adjustment is controlled by spacers and shims between the bearing cones. The ball bearings require no adjustment. Sliding clutch gears are provided to engage and disengage front axle drive and to shift to either speed range. The clutch gears are controlled by shift levers in the driver's compartment.

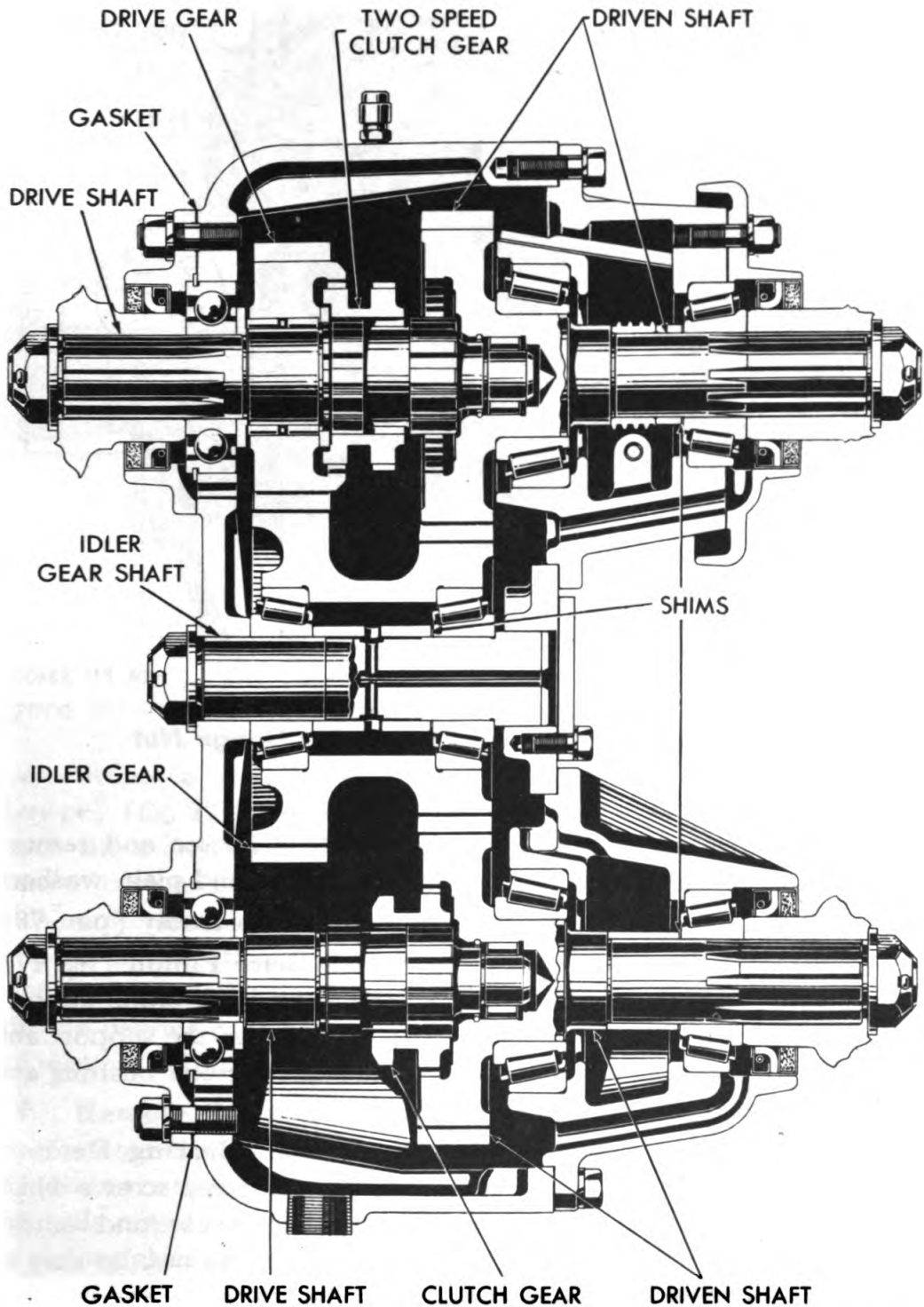
31. REMOVAL OF TRANSFER CASE ASSEMBLY.

a. **Disconnect Propeller Shafts.** Open the universal joint clamp bolt nut locks and remove the nuts. Remove the clamp bolt nuts and clamps. Slide the splined yokes on the propeller shaft and disconnect the shafts from the transfer case.

b. **Disconnect Speedometer Cable, Control Rods and Hand Brake Cable.** Unscrew the speedometer cable housing connection at the transfer case. Remove the cotter pins from the transfer case end of the control rods and unhook the rods. Remove the clevis pin from the brake cable where it is attached to the brake cam levers.

c. **Remove Transfer Case from Mounting Brackets.** Raise the transfer case on a jack sufficiently to support it and remove the attaching cap screws. Lower the assembly from the mounting brackets.

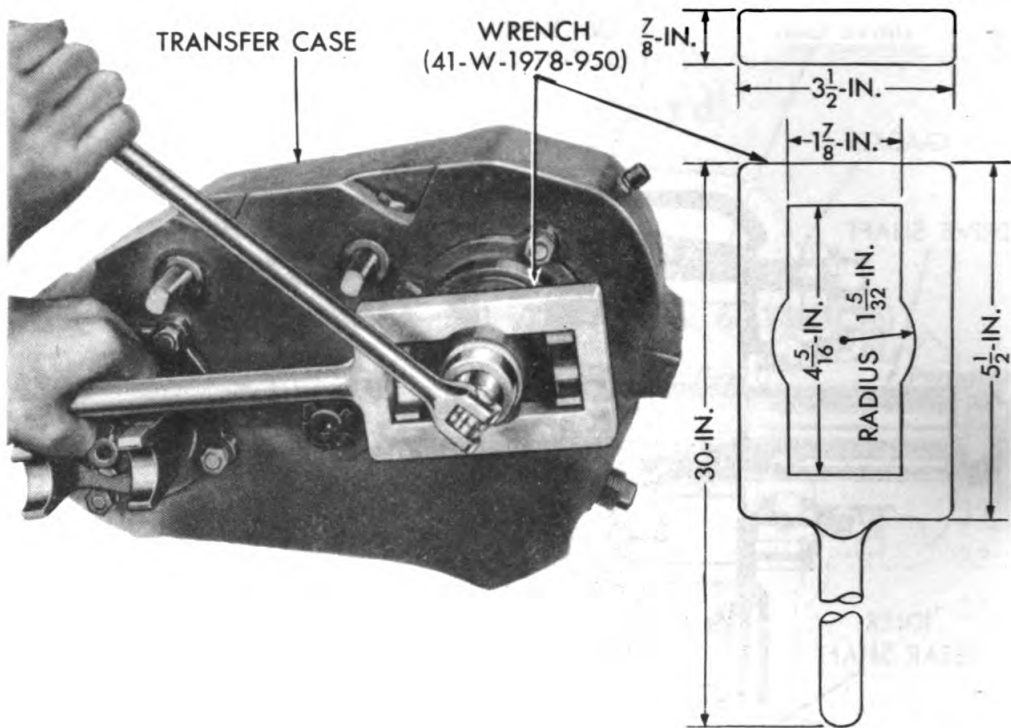
TRANSFER CASE (1½ TON, 6 x 6 TRUCK)



RA PD 53466

Figure 22—Transfer Case (1½ Ton, 6 x 6 Truck)

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)**



RA PD 53430

Figure 23—Removing Companion Flange Nut

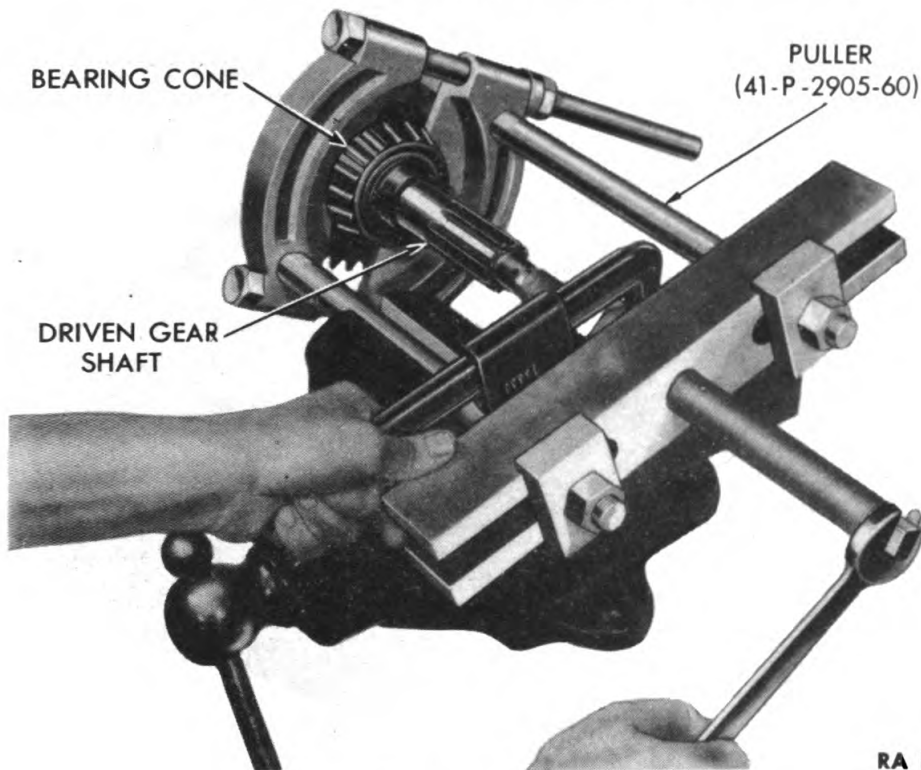
32. DISASSEMBLY OF TRANSFER CASE.

a. **Remove Companion Flanges** (fig. 23). Loosen and remove all companion flange nuts and remove the flanges and plain washers.

b. **Remove Hand Brake Band and Drum Assembly** (par. 78).

c. **Remove Brake Support and Speedometer Pinion** (fig. 27). Remove the nuts and washers which attach the hand brake support (N, fig. 27) to the rear bearing retainer and remove the support and gasket. Drive out the oil seal. Unscrew the speedometer bushing and remove the bushing with the speedometer pinion.

d. **Remove and Disassemble Driven Shaft Bearing Retainer (Upper)** (fig. 27). Remove the stud nuts and the cap screws which attach the bearing retainer (upper) (T, fig. 27) to the case and remove the retainer assembly and gasket. If the studs come out, be sure to install them in their original position. Press the gear out of the retainer. Drift the bearing cups out of the retainer. Remove the shims, the spacer and the speedometer gear from the shaft. Carefully preserve the shims for assembly in their original position. Pull the bearing cone and roller assembly off the shaft (fig. 24). Remove the rollers from the gear end of the shaft.

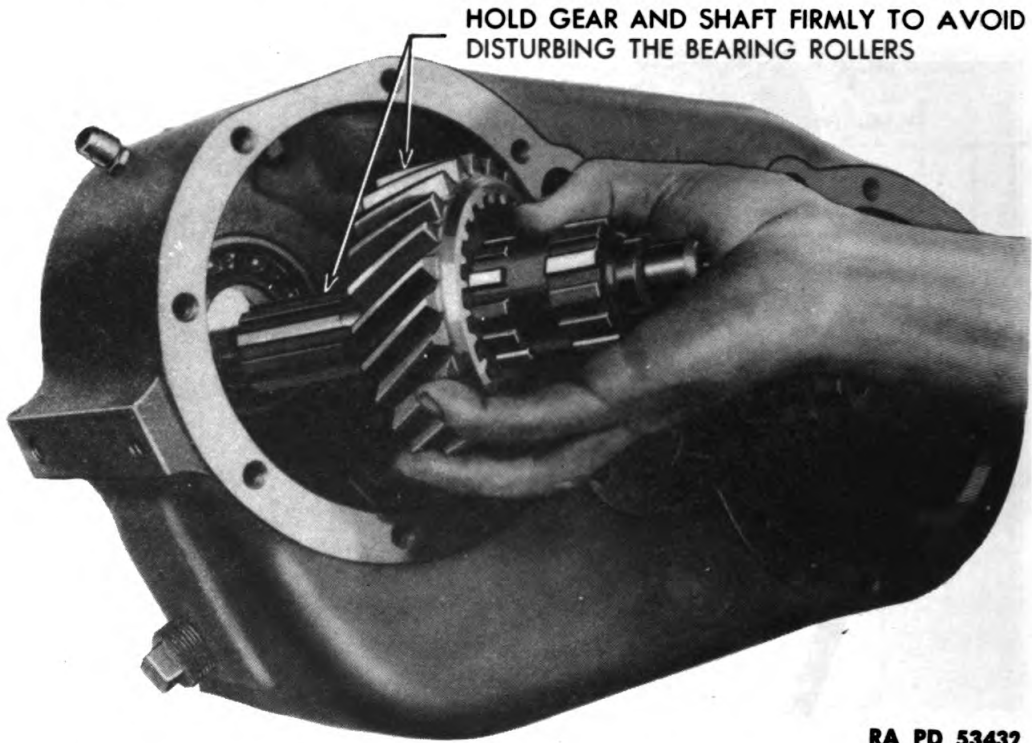
TRANSFER CASE (1½ TON, 6 x 6 TRUCK)**Figure 24—Removing Transfer Case Driven Shaft Bearing Cone**

e. **Remove and Disassemble Driven Shaft Bearing Retainer (Lower)** (fig. 27). Remove the cap screws, nuts and washers which attach the driven shaft bearing retainer (lower) (CO, fig. 27) to the transfer case and remove the retainer assembly and gasket. If the studs come out, install them in their original position. Press the gear shaft out of the retainer. Remove the shims and spacer from the shaft carefully to preserve the shims for assembly in their original position. Pull the bearing cone and roller assembly off the gear shaft (fig. 24) and remove the rollers from the gear end of the shaft.

f. **Remove Both Shift Forks, Rails and Sliding Clutches** (fig. 27). Remove the shift fork lock screw wire and lock screws (TT, fig. 27). Remove the shift rail screws (OO, fig. 27) and springs. Slide the shift rails out of the case and remove the forks and poppet balls. Pull the sliding clutch gears off the upper and lower drive shafts.

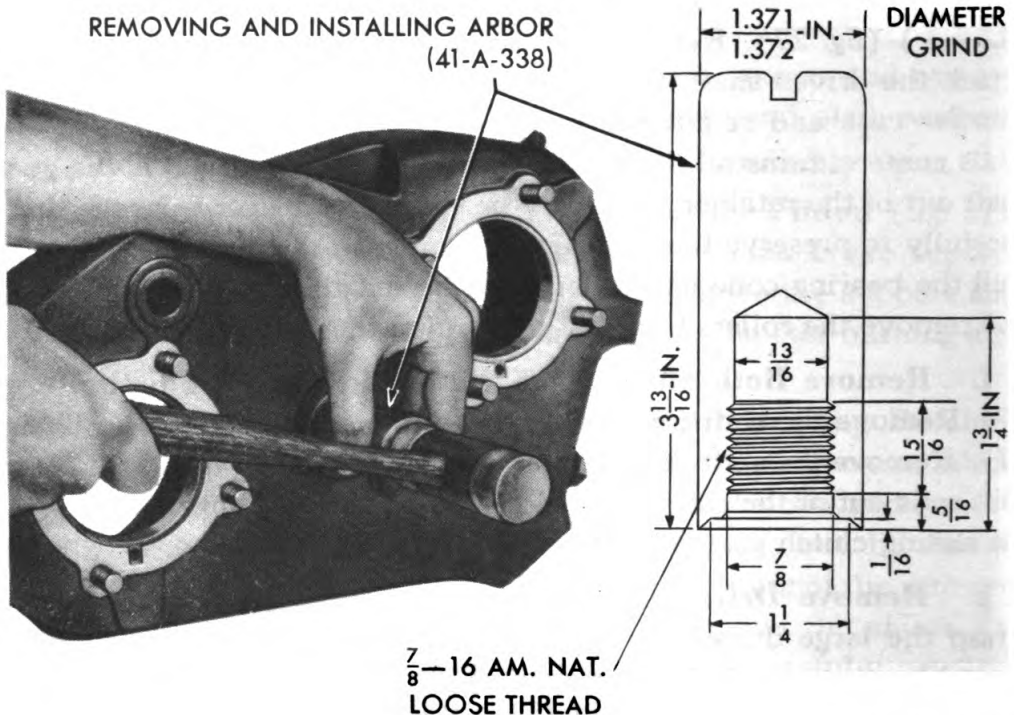
g. **Remove Drive Gear and Drive Shaft (Upper)** (fig. 27). Grasp the large drive gear (II, fig. 27) and pull the gear and shaft assembly out through the rear opening of the case. If the shaft is tight in the front ball bearing, tap it through with a brass drift. Keep the parts of the assembly firmly together while removing to avoid disturbing the rollers of the drive gear bearing (fig. 25).

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Figure 25—Removing Transfer Case Drive Shaft and Gear



RA PD 53433

Figure 26—Removing Transfer Case Idler Gear Shaft

TRANSFER CASE (1½ TON, 6 x 6 TRUCK)

h. Disassemble Drive Gear and Shaft (fig. 27). Pull the drive shaft out of the drive gear and remove the rollers (HH, fig. 27) of the bearings and the roller spacer.

i. Remove Drive Shaft Front Bearing Retainer Oil Seal and Ball Bearing (fig. 27). Remove the drive shaft front bearing retainer assembly (XX, fig. 27) and drift out the ball bearing. Preserve the gaskets for assembly in their original position. Drift the oil seal out of the bearing retainer.

j. Remove Drive Shaft (Lower) and Ball Bearing (fig. 27). Remove the drive shaft front bearing retainer (BS, fig. 27). Drift the oil seal out of the bearing retainer. Preserve the gaskets for assembly in their original position. Drift the shaft out of the ball bearing and remove thrust washer from the shaft. Drift the ball bearing out through the front of the case.

k. Remove and Disassemble Idler Shaft and Gear (fig. 27). Remove the cotter pin, nut and plain washer from the front end of the idler gear shaft (AQ, fig. 27). Remove the cap cover from the rear end of the shaft. Screw the arbor (fig. 26) firmly on the end of the idler gear shaft and drive the shaft out until it clears the case. Then unscrew the shaft from the arbor and remove the idler gear assembly and arbor from the case. Remove the tapered roller bearings from each end of the gear and remove the bearing spacer and shims. Preserve the shims for assembly in their original position.

l. Remove Shift Rail Oil Seals. Drift the oil seals out of the transfer case.

33. INSPECTION OF TRANSFER CASE PARTS.

a. Clean all parts thoroughly in dry-cleaning solvent. Inspect all bearings, gears and shafts and replace any parts that show evidence of wear or damage. Inspect the case and repair or replace if damaged. Inspect all propeller shaft companion flanges and, if rough or worn where the oil seals contact, replace the flange. Before installing new oil seals, soak in light oil for 30 minutes and roll with a smooth bar.

34. ASSEMBLY OF TRANSFER CASE.

a. Adjust Idler Gear Bearings. Clamp the head of the shaft between copper vise jaws. Oil the roller bearings and place one of them on the shaft. Install the original shims on the shaft. Then install the bearing spacer and the gear assembly with the large gear towards the threaded end of the shaft. Install the remaining roller bearing. Place the spacer tool over the end of the shaft and install the washer and nut.

Legend:

- A—NUT
- B—WASHER
- C—COMPANION FLANGE
- D—HAND BRAKE ANCHOR CLIP SPRING
- E—HAND BRAKE ANCHOR CLIP SCREW
- F—HAND BRAKE CAM PIN
- G—HAND BRAKE SPACER LINK
- H—HAND BRAKE CAM LEVERS
- I—COTTER PIN
- J—HAND BRAKE ADJUSTING BOLT
- K—HAND BRAKE BAND AND LINING
- L—HAND BRAKE DRUM
- M—OIL SEAL
- N—HAND BRAKE SUPPORT
- O—NUT
- P—HAND BRAKE SPACER LINK STUD
- Q—BEARING CONE
- R—BEARING CUP
- S—HAND BRAKE SUPPORT GASKET
- T—BEARING RETAINER
- U—BEARING CUP
- V—BEARING CONE
- W—SHIMS
- X—SPEEDOMETER DRIVE GEAR SPACER
- Y—SPEEDOMETER DRIVE GEAR
- Z—DRIVEN SHAFT (GEAR INTEGRAL)
- AA—ROLLERS
- BB—ROLLER SNAP RING
- CC—CLUTCH GEAR (TWO SPEED)
- DD—DRIVE SHAFT

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Figure 27—Transfer Case Disassembled (1½ Ton, 6 x 6 Truck)

TRANSFER CASE (1½ TON, 6 x 6 TRUCK)

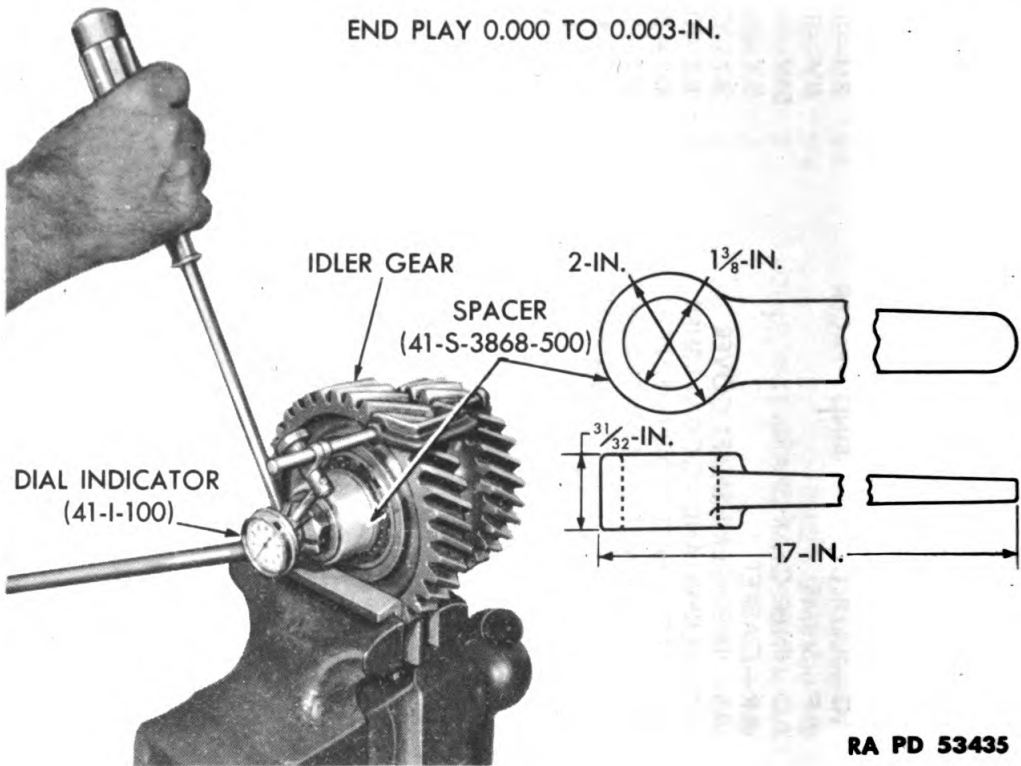
EE—THRUST WASHER—INNER	AJ—BEARING CONE	BP—OIL SEAL
FF—ROLLERS	AK—BEARING CUP	BQ—NUT
GG—ROLLER SPACER	AL—IDLER GEAR	BR—LOCK WASHER
HH—ROLLERS	AM—BEARING CUP	BS—BEARING RETAINER
II—DRIVE GEAR	AN—BEARING CONE	BT—GASKETS
JJ—THRUST WASHER—OUTER	AO—IDLER GEAR BEARING SPACER	BU—BEARING RING
KK—BEARING RETAINER GASKET	AP—SHIMS	BV—BEARING
LL—FILLER PLUG	AQ—IDLER GEAR SHAFT	BW—SHIFT FORK SCREW
MM—BREATHING NIPPLE	AR—GASKET	BX—SHIFT FORK
NN—CASE	AS—IDLER GEAR SHAFT COVER	BY—CLUTCH SHIFT RAIL
OO—SHIFT RAIL SCREW	AT—SCREW AND LOCK WASHER	BZ—DRAIN PLUG
PP—SHIFT RAIL POPPET BALL SPRING	AU—SPEEDOMETER DRIVE PINION	CD—BEARING RETAINER GASKET
QQ—SHIFT RAIL POPPET BALL	AV—SPEEDOMETER DRIVE PINION NUT	CE—THRUST WASHER
RR—TWO SPEED SHIFT RAIL	AW—SCREW AND LOCK WASHER	CF—CLUTCH GEAR
SS—SHIFT FORK	AX—LOCK WASHER	CG—DRIVE SHAFT
TT—SHIFT FORK SCREW	AY—NUT	CH—ROLLERS
UU—BEARING	AZ—LOCK WASHER	CI—ROLLER SNAP RING
VV—BEARING RING	BC—HAND BRAKE ADJUSTING SCREW	CJ—DRIVEN SHAFT (GEAR INTEGRAL)
WW—GASKETS	BD—NUTS	CK—BEARING CONE
XX—BEARING RETAINER	BE—NUT	CL—BEARING CUP
YY—OIL SEAL	BF—LOCK WASHER	CM—DRIVEN GEAR SHAFT SPACER
ZZ—COMPANION FLANGE	BG—HAND BRAKE ADJUSTING BOLT SPRINGS	CN—SHIMS
AB—NUT AND WASHER	BH—WASHER	CO—BEARING RETAINER
AC—NUT	BI—HAND BRAKE OPERATING SPRING	CP—BEARING CUP
AD—LOCK WASHER	BJ—NUTS	CQ—BEARING CONE
AE—SHIFT RAIL SCREW	BK—BOLT	CR—OIL SEAL
AF—SHIFT RAIL POPPET BALL SPRING	BL—COTTER PIN	CS—COMPANION FLANGE
AG—SHIFT RAIL POPPET BALL	BM—NUT	CT—WASHER
AH—WASHER	BN—WASHER	CU—COTTER PIN
AI—NUT	BO—COMPANION FLANGE	CV—NUT

RA PD 53467-B

Legend for Figure 27—Transfer Case Disassembled (1½ Ton, 6 x 6 Truck)

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Hold the handle of the spacer and tighten the nut as tight as it should be when finally assembled. Remove the assembly from the vise and shock both ends of the shaft with a brass drift and light hammer to seat the bearings. Revolve the shaft until the bearings roll smoothly. Shaft must be free rolling with no apparent end play if checked by hand. The adjustment of the bearings is controlled by means of the spacer shims and these are supplied in 0.004, 0.005, 0.0125 and 0.015-inch thickness. If adjustment of bearings is not correct, disassemble the gear



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Figure 28—Checking Idler Gear Bearing Adjustment

and shaft assembly, install or remove shims and repeat the foregoing checking procedure. With this bearing adjustment, the actual end play will be 0.000 to 0.003 inch when measured with a universal dial indicator (41-I-100) if the shaft is forced back and forth with a large screwdriver (fig. 28).

b. **Install Idler Gear and Shaft** (fig. 27). When the idler gear bearings are properly adjusted, remove the nut and spacer tool. Then screw the arbor (41-A-338) on the end of the idler gear shaft (AQ, fig. 27) and pull the tool through the gear and bearing assembly and remove the idler shaft. Install the gear and bearing assembly, with the arbor in place, through the driven gear rear bearing retainer opening

TRANSFER CASE (1½ TON, 6 x 6 TRUCK)

with the large gear toward the front of the case. Line up the gear assembly and arbor so the end of the idler shaft can be threaded into the arbor. Then drive the idler shaft through the bearings and gear and remove the arbor. Install the plain washer and the nut. Tighten the nut securely and install a new cotter pin.

c. **Assemble Driven Shaft Bearing Retainer (Lower) and Adjust Bearings.** Press the bearing cups in place in the bearing retainer (CO, fig. 27). Oil the tapered roller bearings and press the large bearing on the driven gear shaft. Place the bearing retainer over the gear

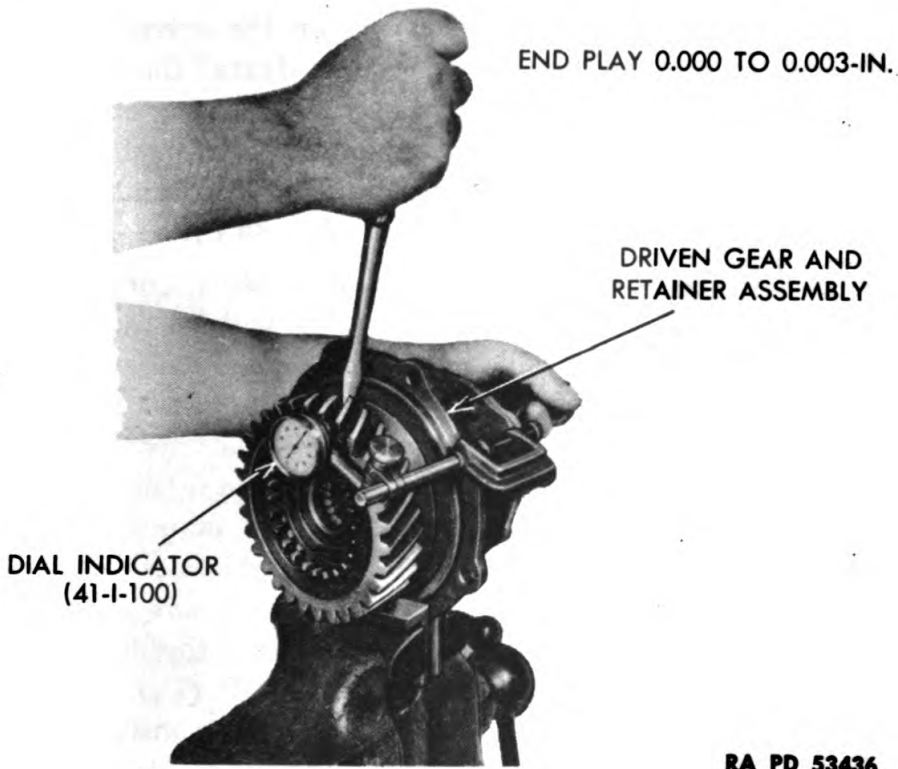


Figure 29—Checking Driven Gear Bearing Adjustment

shaft. Install the spacer on the gear shaft and install the original shims. (Install 0.030-inch shim pack if original shims are lost.) Install the propeller shaft companion flange, washer and nut. Clamp the mounting flange of the bearing retainer assembly between copper jaws in a vise. Hold the companion flange with a companion flange wrench (41-W-1978-950) and tighten shaft nut as tight as for final assembly. Shock the end of the shaft and the center of the gear with a brass drift and light hammer to seat the bearings. Revolve shaft until bearings roll smoothly. Shaft must be free rolling, with no apparent end play if checked by hand. The adjustment of the bearings is controlled by means of the spacer shims and these are supplied in 0.004, 0.005,

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0.0125 and 0.015-inch thickness. If adjustment of bearings is not correct, disassemble the gear and shaft assembly, install or remove shims and repeat the foregoing procedure. With this bearing adjustment, the actual end play will be 0.000 to 0.003 inch when measured with a universal dial indicator (41-I-100), if the gear and shaft is forced back and forth with a screwdriver between the gear and retainer (fig. 29). Remove the companion flange.

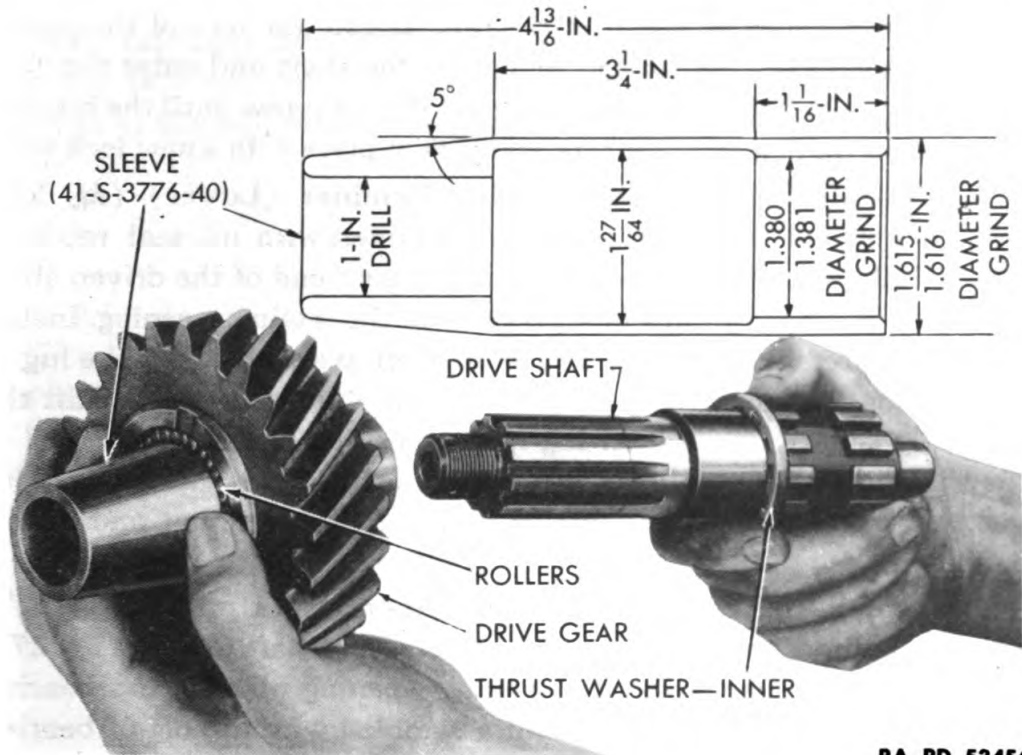
d. Assemble Driven Shaft Bearing Retainer (Upper) and Adjust Bearings. Press the bearing cups in place in the bearing retainer. Oil the roller bearings and large bearing on the driven gear shaft. Place the bearing retainer over the gear shaft. Install the speedometer gear, the spacer and the original shims on the drive gear shaft. Install companion flange from the lower gear shaft, plain washer and nut. Clamp the mounting flange of the bearing retainer assembly between copper jaws in a vise and adjust bearings (par. 34 e).

e. Install Drive Shaft (Lower) (fig. 27). Drift a new oil seal in the drive shaft front retainer (BS, fig. 27) with oil seal replacer (41-R-2395-40). Install the ball bearing in the case and seat it firmly. Hold the retainer against the bearing without the paper gaskets, and insert a feeler gage between the retainer and case to determine the maximum clearance. Then install gaskets of a total thickness 0.005 inch greater than the maximum clearance. Front retainer gaskets are supplied in 0.009, 0.013, 0.018 and 0.022-inch thickness. When the retainer has been properly fitted, install it, making sure the oil drain hole cut-out of the gasket indexes with the drain at the bottom of the retainer. Install the plain washer on the drive shaft (CG, fig. 27) and insert the drive shaft through the front retainer and install the companion flange, plain washer and nut. Hold the flange, tighten the nut and install a new cotter pin. Install the clutch gear on the shaft with the plain shoulder end of the gear towards the front of the case.

f. Install Drive Shaft Bearing (Upper) (fig. 27). Drift a new oil seal in the drive shaft bearing retainer (XX, fig. 27) with oil seal replacer (41-R-2395-40). Install the ball bearing in the case and seat it firmly. Hold the retainer against the bearing without the paper gaskets and insert a feeler gage between the retainer and case to determine the maximum clearance. Then install gaskets of a total thickness 0.005 inch greater than the maximum clearance. The retainer gaskets are supplied in 0.009, 0.013, 0.018 and 0.022-inch thickness. When the retainer has been properly fitted, install it, making sure the oil drain hole cut-out of the gaskets indexes with the drain at the bottom of the retainer.

TRANSFER CASE (1½ TON, 6 x 6 TRUCK)

g. **Assemble and Install Drive Shaft (Upper)** (fig. 30). Install one row of 35 rollers (FF, fig. 27) in the drive shaft gear. Then install the roller spacer washer (GG, fig. 27) and the second row of 35 rollers (HH, fig. 27). Use heavy grease to hold the rollers in place while assembling. Insert the bearing sleeve in the gear, with the taper in the direction of the threaded end of the shaft (fig. 30). Then install the serrated washer on the shaft and slide the gear on the shaft, against the serrated washer. Install the plain washer on the shaft. Hold the gear in place on the shaft to prevent loss of the bearings and install the



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Figure 30—Installing Drive Gear on Shaft

assembly, with the threaded end of the drive shaft through the front bearing. Install the large companion flange, washer and nut. Hold the flange, tighten the nut and install a new cotter pin. Install the two-speed clutch gear on the drive shaft with the recess facing toward the front of the case.

h. **Install Shift Rail Oil Seals.** Drift new oil seals into shift rail front openings of the transfer case.

i. **Install Fork and Shift Rail (Lower)** (fig. 27). Place the shift fork (BX, fig. 27) on the clutch gear so the lock screw is facing upward. Insert the long rail through the fork and install the poppet ball, spring and screw. Move the rail toward the rear of the case until the poppet

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ball engages in the second indent of the rail. Locate the face of the clutch gear flush with the rear end of the splines on the shaft and enter the fork set screw in the hole in the rail. Tighten the set screw until the head of the screw is tight against the fork and lock in place with a new lock wire.

j. Install Fork and Rail (Upper) (fig. 27). Place the shift fork (SS, fig. 27) on the clutch gear so the lock screw is facing down. Insert the short rail through the fork and install the poppet ball, spring and screw. Move the rail toward the rear of the case until the poppet ball engages in the second indent of the rail. Locate the face of the clutch gear flush with the end of the splines on the shaft and enter the fork set screw in the hole in the rail. Tighten the set screw until the head of the screw is tight against the fork and lock in place with a new lock wire.

k. Install Driven Shaft Bearing Retainer (Lower) (fig. 27). Drift a new oil seal in the bearing retainer with oil seal replacer (41-R-2395-40). Install the rollers in the gear end of the driven shaft gear (CJ, fig. 27). Install a new gasket over the retainer opening. Install the bearing retainer (CO, fig. 27), with shaft assembled with the lug of the bearing retainer covering the end of the shift rail opening. Lift the assembly slightly while inserting it into position to engage the end of the shaft in the gear rollers. Install the nuts and the cap screws with lock washer. Hold the companion flange, tighten the nut and install cotter pin.

l. Install Driven Shaft Bearing Retainer (Upper) (fig. 27). Install the rollers in the gear end of the driven shaft gear (Z, fig. 27). Install a new gasket over the retainer opening. Install the bearing retainer (T, fig. 27), with the shaft assembled with the lug of bearing retainer covering the opening for the shift rail. Lift the assembly slightly, while inserting it in position, to engage the end of the shaft in the gear rollers. Install the nuts and the cap screws with lock washers.

m. Install Speedometer Pinion and Brake Support. Install the speedometer pinion and bushing assembly. Install the brake support with a new gasket and oil seal.

n. Install Hand Brake Drum (par. 78 j).

o. Install Hand Brake Band Assembly (par. 78 k and m).

p. Adjust Hand Brake (par. 78 p).

35. INSTALLATION OF TRANSFER CASE ASSEMBLY.

a. Attach Transfer Case to Mounting. Support the transfer case in position on a jack and install the attaching cap screws with lock washers and lock wires.

TRANSFER CASE (1½ TON, 6 x 6 TRUCK)

b. **Connect Speedometer Cable, Control Rods and Hand Brake Cable.** Fit the end of the speedometer cable in the pinion and attach the housing to the pinion bushing. Insert the ends of the control rods in the shift rail ends and install new cotter pins. Install the clevis pin to attach the brake cable to the brake cam levers.

c. **Connect Propeller Shafts.** Slide the splined yokes on the propeller shafts to connect the universal joints. Install the clamps and install the clamp bolts with clamp bolt locks. Install the clamp bolt nuts with new nut locks.

d. **Fill Transfer Case with Lubricant.** Remove filler plug and fill with lubricant until lubricant is ½ inch below filler opening, with transfer case and lubricant at room temperature (70° F.). Do not overfill, as this will cause overheating and leakage of lubricant.

CHAPTER 2

POWER TRAIN (Cont'd)

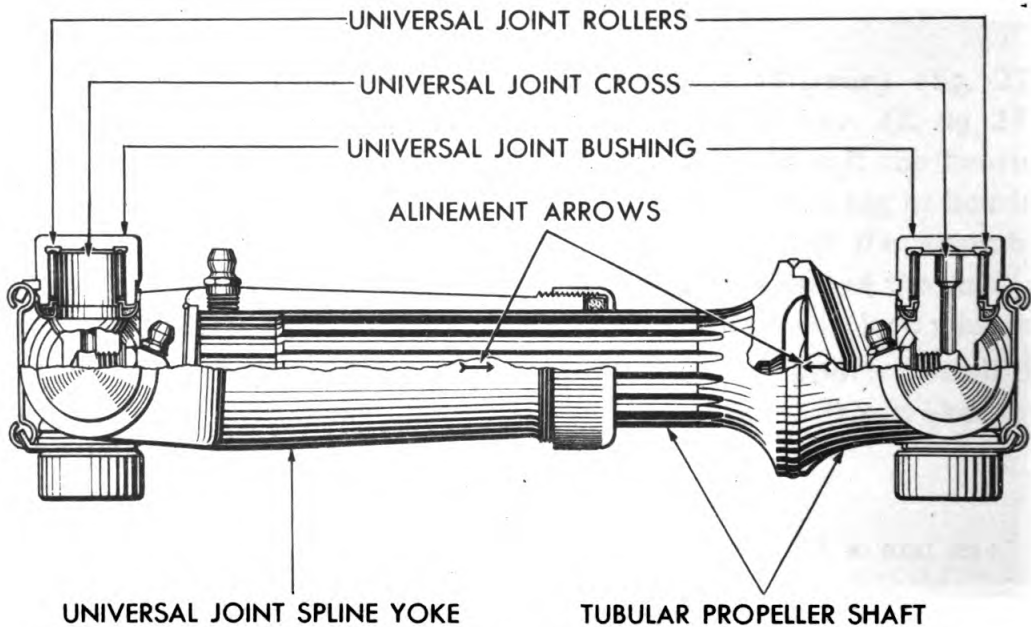
Section VI

PROPELLER SHAFTS AND UNIVERSAL JOINTS

	Paragraph
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Removal of propeller shaft and universal joint assembly.....	37
Disassembly and assembly of universal joint.....	38
Installation of propeller shaft and universal joint assembly....	39
Disassembly and assembly of pillow block (1½ ton, 6 x 6 truck)	40

36. DESCRIPTION OF CONSTRUCTION.

a. **Propeller Shafts and Universal Joints** (fig. 31). Tubular propeller shafts are equipped with cross and roller type universal joints.



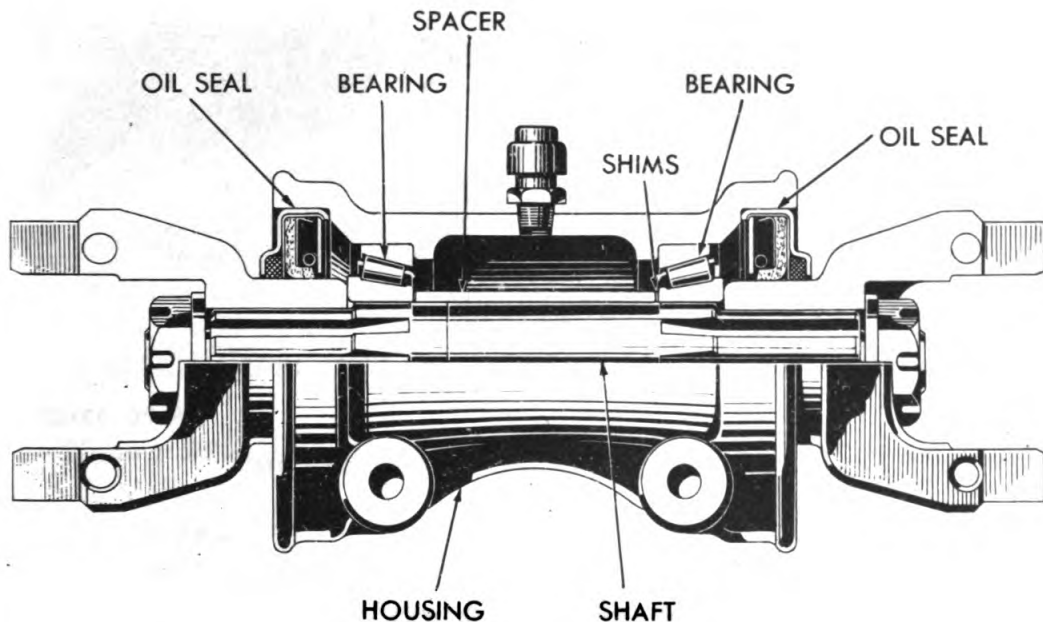
RA PD 53468

Figure 31—Cross Section of Propeller Shaft and Universal Joints

PROPELLER SHAFTS AND UNIVERSAL JOINTS

The cross operated in rollers which are contained in bushings clamped in the propeller shaft yoke and companion flange. The yoke is splined to one end of the shaft to permit variant lengths of the propeller shaft when the truck is in operation.

b. **Pillow Block (1½ Ton, 6 x 6 Truck)** (fig. 32). A pillow block mounted on the front rear axle housing of the 1½ ton, 6 x 6 truck consists of two tapered roller bearings in a housing. Bearing



RA PD 53469

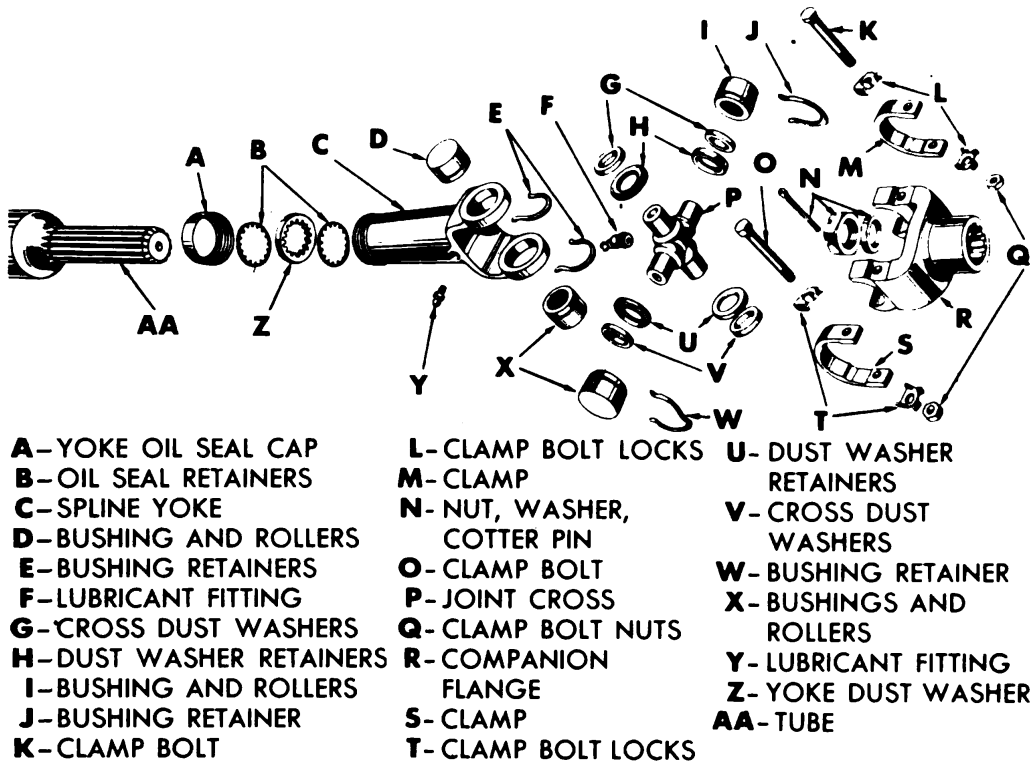
Figure 32—Cross Section of Pillow Block (1½ Ton, 6 x 6 Truck)

adjustment is controlled by a spacer and shims between the bearing cones. Lubricant is retained in the pillow block housing by oil seals at each end of the housing.

37. REMOVAL OF PROPELLER SHAFT AND UNIVERSAL JOINT ASSEMBLY.

a. Pry the universal joint clamp bolt nut locks open on both front and rear joints of the propeller shaft, and remove the nuts (fig. 33). Remove the bolts and bolt locks and then remove the clamps. Slide the yoke back on the splined end of the propeller shaft and separate the cross from the companion flange.

PROPELLER SHAFTS AND UNIVERSAL JOINTS



RA PD 53480

Figure 35—Propeller Shaft and Universal Joint Disassembled**38. DISASSEMBLY AND ASSEMBLY OF UNIVERSAL JOINT.**

a. **Disassemble Joint** (fig. 35). Slide the splined yoke off the propeller shaft. Pry off the retainer link. Pull off the two bushing and roller assemblies. Drive the bushing retainers out of the recess in the two remaining bushings. Place the universal joint between the open jaws of a vise or in an arbor press, with a 1¼-inch socket over the bushing at one end and the arbor at the other end (fig. 34). Apply pressure on the arbor to force the bushing out of the yoke, stopping just before the seal retainer on the right angle cross contacts the yoke to prevent damaging the retainer. Pull the bushing the rest of the way out of the yoke with a large pair of pliers. Then reverse the yoke and press on the cross pin with arbor in the same manner until the other bushing is removed (fig. 34). Tilt the cross in the yoke and remove it. Remove the dust seal washers from the cross pins of the cross. Do not remove the dust washer retainers from the cross pins unless they are damaged and are to be replaced. Unscrew the oil seal cap from the yoke and remove the oil seal washers and oil seal. Follow the same procedure for all universal joints.

b. **Clean All Parts.** Wash all parts in dry-cleaning solvent, and dry with compressed air.

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c. **Inspect Cross** (fig. 35). Examine the cross for excessive wear and scoring. Replace the cross if the bearing surface is rough or worn. Clean out the lubrication passages. Inspect cross for lubrication slot across the end of each cross pin. If not slotted, grind a small slot in end of cross pin.

d. **Inspect Spline Yoke and Propeller Shaft Yoke and Spline.** Examine the fit of the spline yoke on the propeller shaft for excessive wear. Check the threads of the oil seal cap and replace the cap if it is damaged or the threads are not satisfactory. Examine the propeller shaft spline end and the opposite end yoke for wear and replace the shaft if the ends are not satisfactory. When checking the fit of the splined yoke on the propeller shaft, always line up the arrows (fig. 31), as the parts must be assembled in this manner.

e. **Replace Parts.** Replace the felt washers to prevent oil leakage. Also, replace the bushing and roller assemblies because it is difficult to determine the extent of wear or damage. Use new bushing retainers, when they are removed from the bushings.

f. **Assemble Propeller Shaft Joint.** Install new dust washers on the universal joint cross pins. Tilt the cross and insert one of the cross pins through the yoke bushing opening of the propeller shaft. Make sure the lubricant fitting is facing toward the yoke, and then hold the cross in position in the yoke while installing the bushings. Lubricate the bushings. Press both bushings into the yoke and over the cross pins far enough so the bushing retainers can be installed. Insert the retainers and drive them into place. Follow the same procedure for all universal joints.

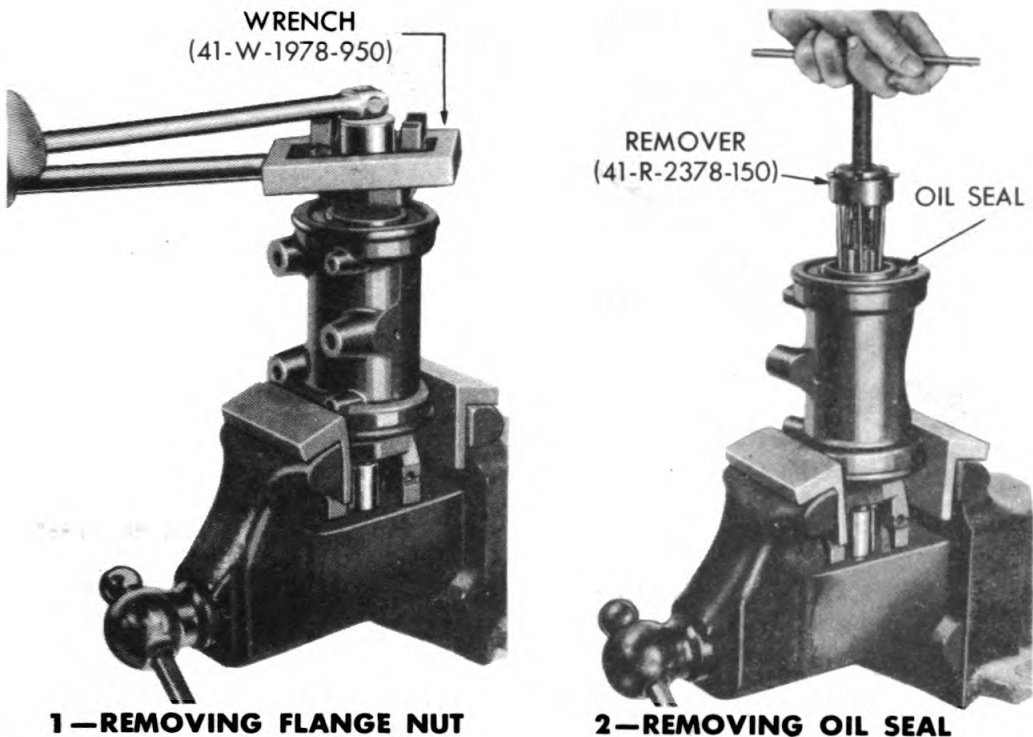
g. **Install Universal Joint Sliding Yoke.** Install the yoke oil seal cap over the splined end of the propeller shaft with the threaded end facing the end of the shaft. Install one of the splined yoke dust washers on the shaft. Install the other dust washer retainer and slide the sliding yoke on the shaft, with the arrows of the yoke and the shaft pointing towards each other (fig. 31). Then push the dust washer and retainers against the end of the sliding yoke and screw the cap in position so the dust washer will firmly contact the splined end of the propeller shaft. Lubricate through lubricant fittings with general purpose grease, the grade depending on temperature.

**39. INSTALLATION OF PROPELLER SHAFT AND
UNIVERSAL JOINT ASSEMBLY.**

a. Install the two loose bushing and roller assemblies on the cross pins of the propeller shaft universal joint, making sure the retainers

PROPELLER SHAFTS AND UNIVERSAL JOINTS

are in place on the bushings (fig. 33). Assemble the bushing and joint assembly into the companion flange. Install the bushing clamps and fasten in position with the clamp bolts assembled with the clamp bolt locks. Then install new clamp bolt nut locks and the nuts. Tighten the nuts and bend over the lugs of all clamp bolt nuts so the nuts will not loosen.



RA PD 53458

Figure 36—Removing Pillow Block Flange Nut and Oil Seal

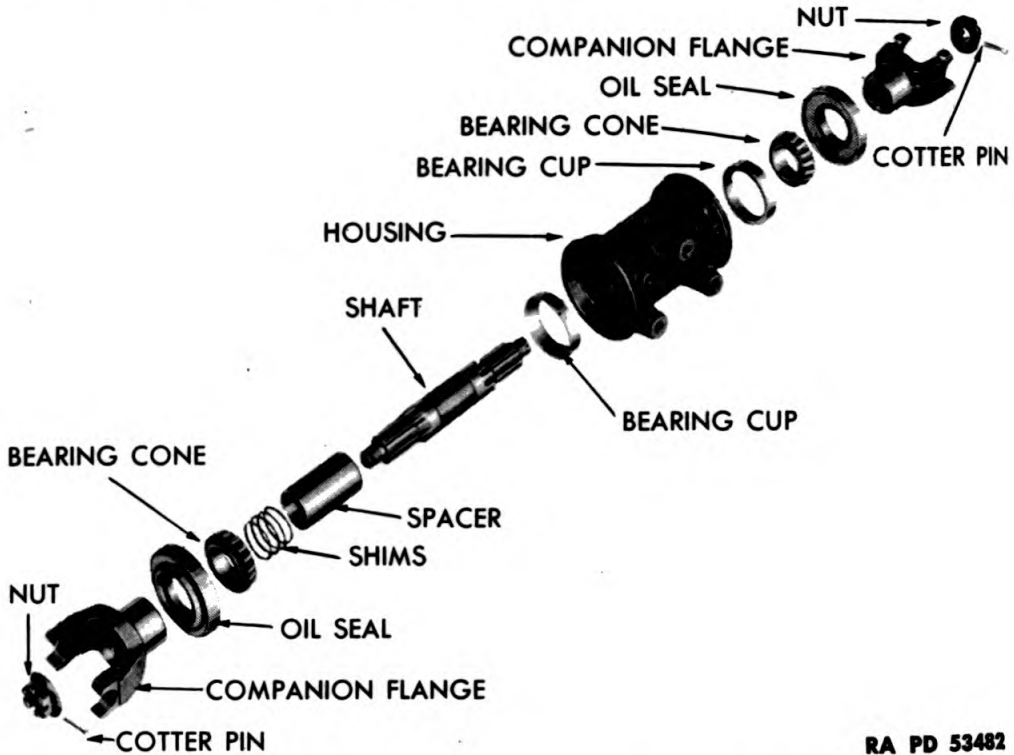
40. DISASSEMBLY AND ASSEMBLY OF PILLOW BLOCK (1½ TON, 6 x 6 TRUCK).

a. **Disassemble Pillow Block** (fig. 37). Remove the companion flanges (1, fig. 36) and pull the oil seals (2, fig. 36). Drift or press the shaft out of one of the bearings. Remove shims, bearing spacer and bearing from shaft. Drift the bearing cups from the housing.

b. **Assemble Pillow Block** (fig. 37). With drift (41-D-1546-60) install the bearing cups into the housing. Oil the bearings and assemble one bearing, bearing spacer and shims on the shaft. Insert the shaft through the housing and install the other bearing, propeller shaft companion flanges and nuts.

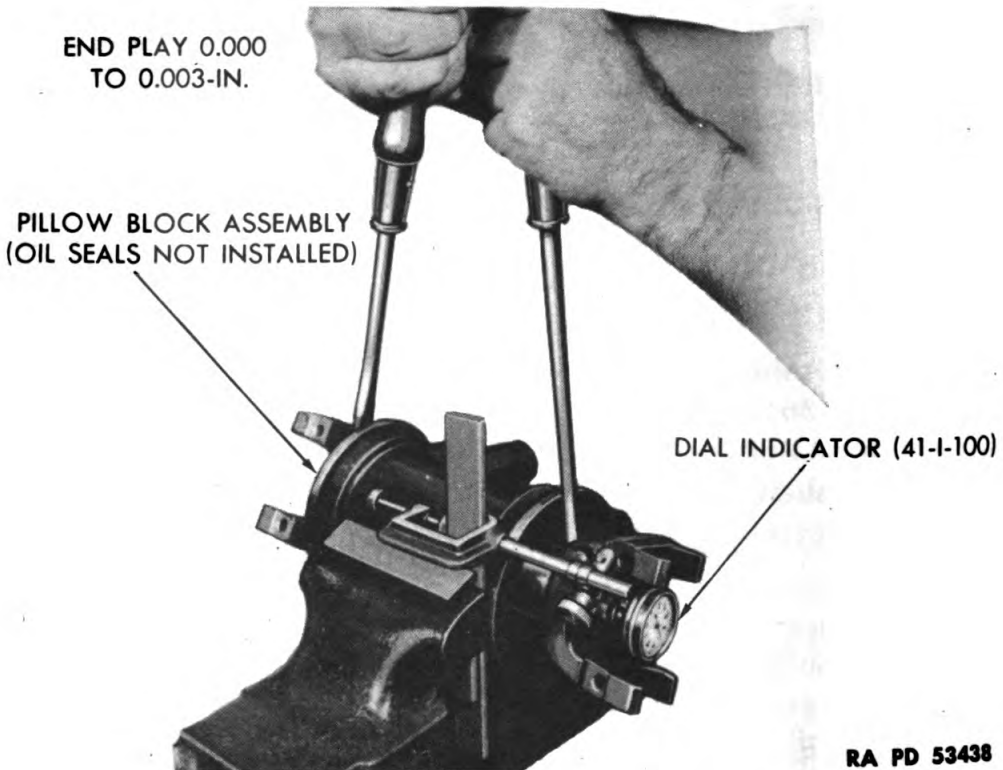
c. **Check Bearing Adjustment and Install Oil Seals.** Clamp the assembly in a vise and hold companion flanges with companion flange

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Figure 37—Pillow Block Disassembled



RA PD 53438

Figure 38—Checking Pillow Block Bearing Adjustment

PROPELLER SHAFTS AND UNIVERSAL JOINTS

wrench (41-W-1978-950) and tighten nuts as tight as for final assembly, with the same amount of threads exposed at each end of shaft. Shock each end of shaft with a brass drift and light hammer to seat bearings and rotate shaft until bearings roll smoothly. Shaft must be free rolling with no apparent end play if checked by hand. The adjustment of bearings is controlled by means of spacer shims and these are supplied in 0.003, 0.005 and 0.007-inch thickness. If adjustment of bearings is not correct, disassemble pillow block and install or remove shims and repeat foregoing checking procedure. With this bearing adjustment, the actual end play will be 0.000 to 0.003 inch when measured with a universal dial indicator (41-I-100), if the shaft is forced back and forth with heavy screwdrivers (fig. 38). Remove companion flanges and drift in new oil seals with oil seal replacer (41-R-2395-40). Install companion flanges and tighten nuts so that equal amount of threads are exposed at each end of the shaft. Install cotter pins. Lubricate the pillow block through lubricant fittings with general purpose grease, grade depending on temperature.

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CHAPTER 2

POWER TRAIN (Cont'd)

Section VII

FRONT AXLE

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Removal of front axle assembly.....	44
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Assembly of universal drive.....	48
Assembly of front axle.....	49
Installation of front axle assembly.....	50

41. DESCRIPTION OF CONSTRUCTION.

a. **Front Axle Assembly** (fig. 39). The front axle is of the full floating driving type. Power is transmitted from the differential assembly to the wheels through drive shafts with universal joints at the steering knuckles. The steering knuckle flanges are mounted on adjustable tapered bearings.

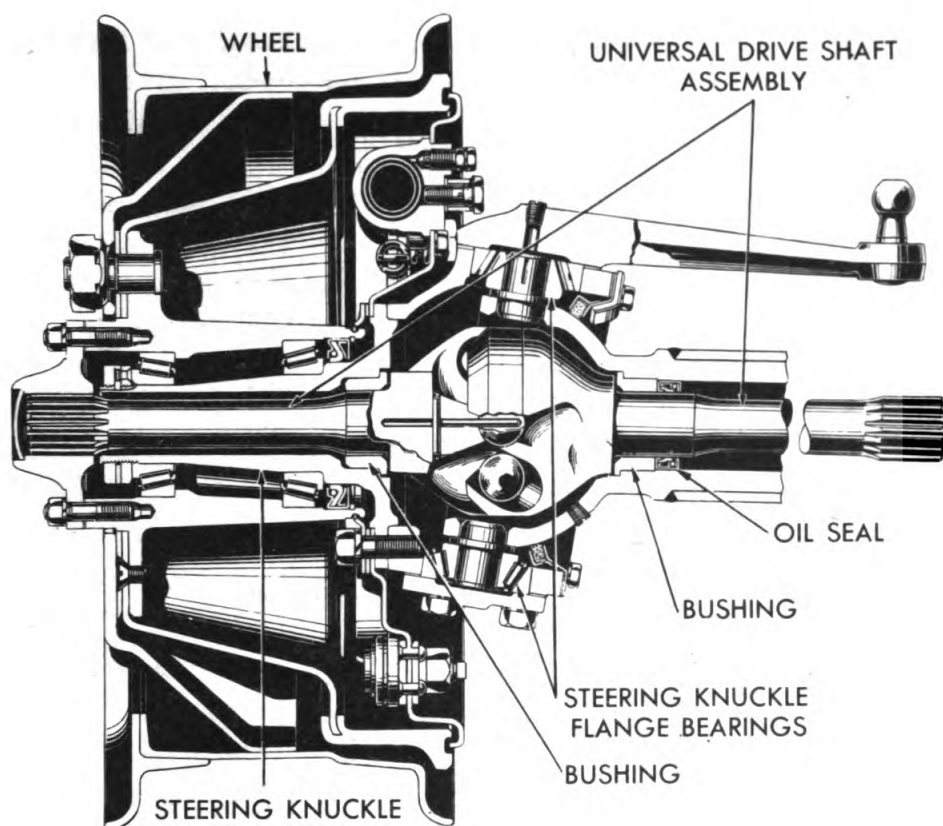
b. **Universal Drive Assemblies** (fig. 39). The universal drive assemblies are carried by bushings in the axle housing and steering knuckles. An oil seal in the housing prevents mixing of the differential and steering knuckle lubricants. The universal drive shaft joint lubricant is retained in the universal joint and steering knuckle housings by the housing bushing and the steering knuckle bushing.

c. **Differential and Carrier.** The differential and carrier assembly can be removed as a unit. Refer to paragraphs 58, 59 and 60 for description of construction, disassembly, inspection and assembly procedure.

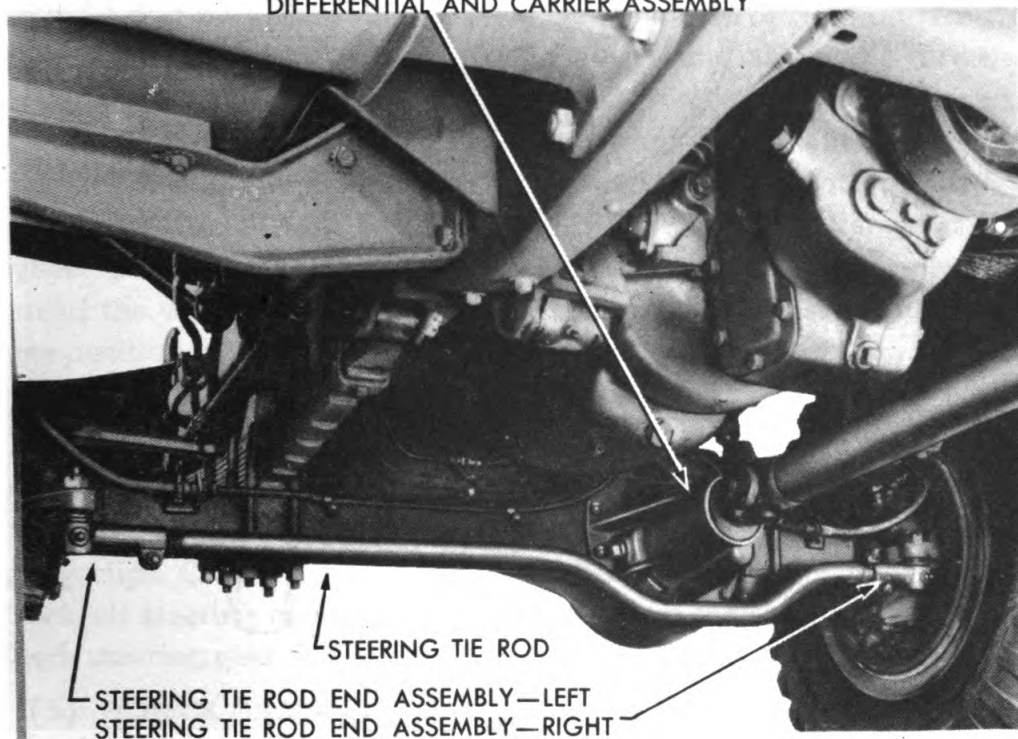
42. FRONT WHEEL ALINEMENT.

a. **General** (fig. 40). When making corrections to front wheel
nement, or when installing new front axle parts, check the camber,

FRONT AXLE



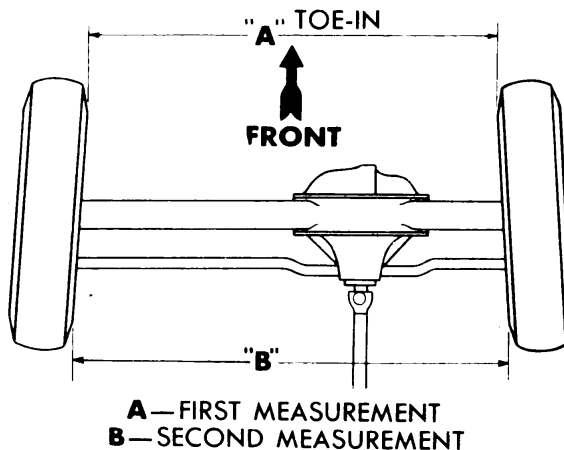
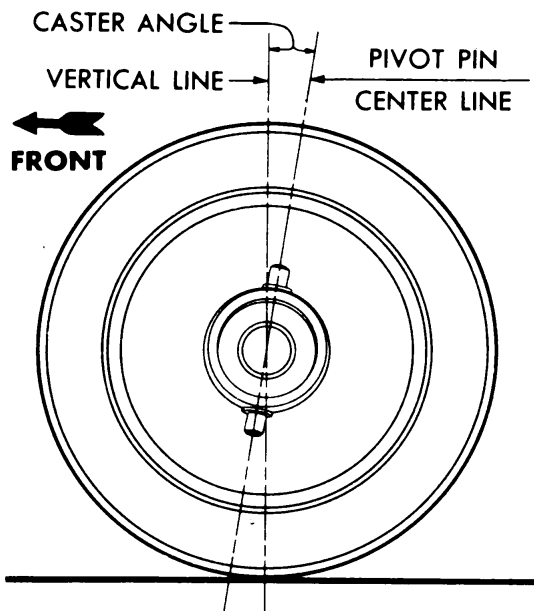
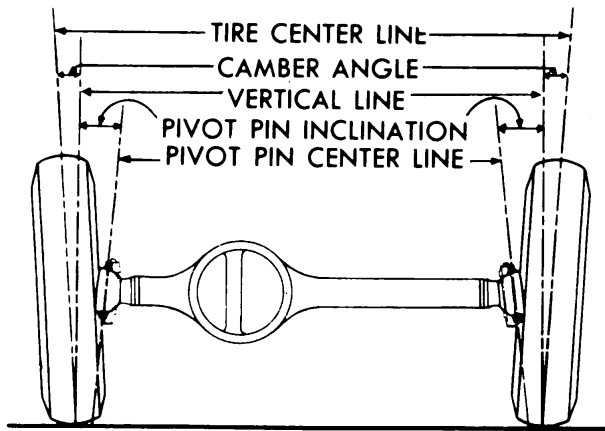
DIFFERENTIAL AND CARRIER ASSEMBLY



RA PD 53483

Figure 39—Front Axle

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RA PD 53443

Figure 40—Front Wheel Alinement Angles

FRONT AXLE

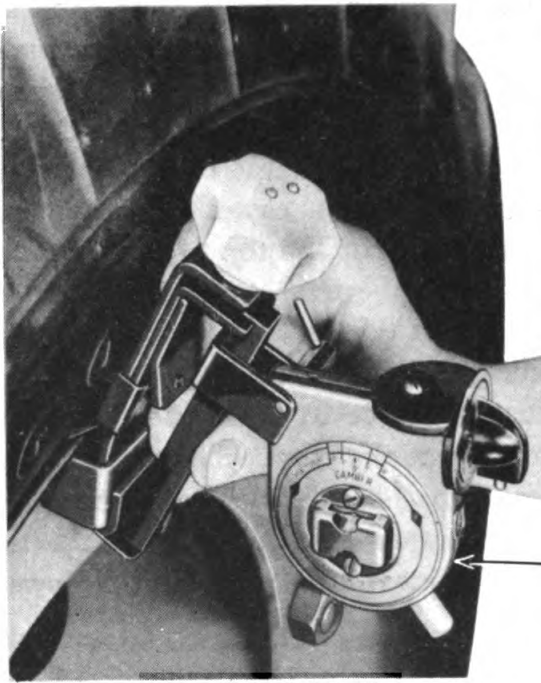
caster, pivot inclination and toe-in of both front wheels. Camber is the amount the wheel inclines away from the vertical at the top as viewed from the front of the truck. The correct wheel camber is incorporated in the axle and cannot be altered by any adjustment. Caster is the amount the top of the steering knuckle pivot pins are inclined toward the side of the truck. The correct caster angle is built into the axle housing. If all parts are in normal condition, caster will be within specifications. Pivot inclination is the amount the top of the steering knuckle pivot pins incline away from the vertical, toward the center of the truck as viewed from the front of the truck. When the pivot inclination is incorrect, it is an indication of a bent front axle housing, and the necessary corrections must be made to bring the pivot pin angle within limits. Toe-in is the amount the front wheels are closer together at the front than they are at the back as viewed from top of the truck. Adjustment is made by lengthening or shortening the tie rod. Before checking the alinement of front wheels, proceed as follows:

(1) **CHECK WHEELS AND TIRES.** Inflate all tires to 40 pounds pressure. Check condition of tires. If tires have been vulcanized, re-treaded or worn unevenly, check static balance of wheel and tire assemblies. If out of balance more than 50 inch-ounces, balance the assemblies. To statically balance a wheel and tire assembly, clean off any mud that may have accumulated on the wheel or tire and remove the axle drive flange. Jack the tire off the ground and make sure the brakes are not dragging and that the wheel rotates freely on its bearings. Start the wheel rotating and let it stop. If the wheel is out of static balance, it will always stop in the same position with the heavy part down. Install two balance weights on the wheel flange at the highest point or directly opposite the heavy part of the assembly. Spread the weights until the wheel will rotate without stopping in the same position. Check wheel and tire run-out and, if greater than $\frac{1}{4}$ inch, straighten wheel or replace wheel or tire.

(2) **CHECK WHEEL BEARINGS, SPRINGS AND STEERING MECHANISM.** Adjust wheel bearings if loose (par. 49 i). Inspect all chassis springs for excessive sag, broken leaves or broken center bolt. Tighten spring clips. Check steering knuckle bearing adjustment (par. 49 c). Check all steering connections and reduce lost motion to a minimum. Check steering gear adjustment (par. 82).

(3) **CHECK SHOCK ABSORBERS.** Check shock absorber control by disconnecting the link and moving the arm up and down. If the arm moves in either direction without considerable resistance, recondition or replace the shock absorber (par. 90).

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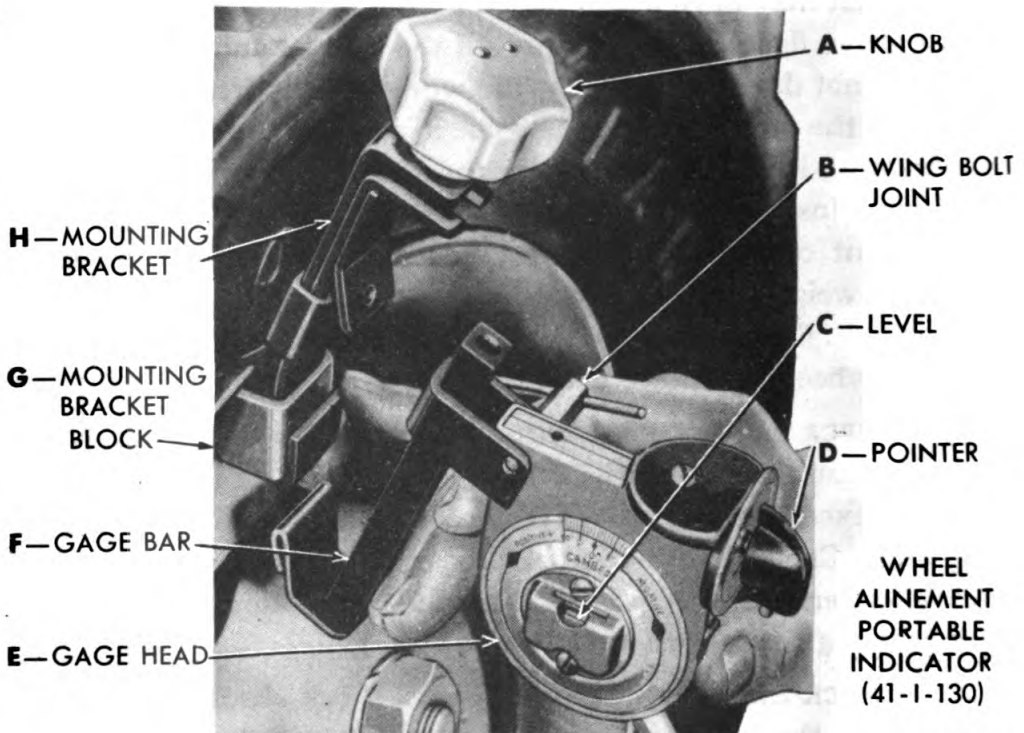
TOP POSITION



BOTTOM POSITION

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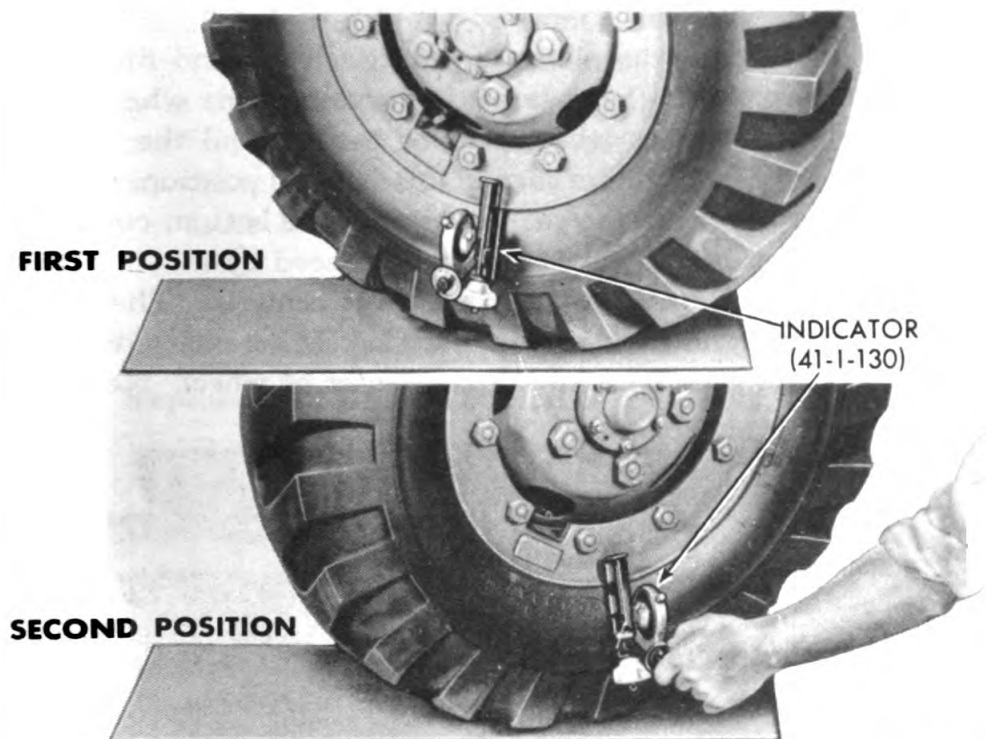
Figure 41—Checking Camber



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Figure 42—Mounting of Wheel Alinement Indicator

FRONT AXLE



RA PD 53445

Figure 43—Checking Caster

b. **Check Camber** (fig. 41). Place the truck on level floor with tires equally inflated to 40 pounds. With the use of equipment illustrated in figure 42, and wheels straight ahead, clamp the bracket H at top of wheel. Next, adjust the dial mark of the indicator at zero and hold the bar F against the bracket as shown in figure 42, and level the head by moving it in the wing bolt joint B. The term "level the head" means to move the entire head up or down until the air bubble in the tube is centered. If desired, the bubble can be roughly centered by moving the head and final adjustment made by turning the pointer D. After setting the head on center, remove the head (as it will drop if not held by hand) and lay it on the floor. Then roll truck forward until the bracket reaches the bottom of the wheel as shown in figure 41. Then set the bar back against the bracket as shown. Note the air bubble. If it is on center, the wheel has zero camber. If the air bubble moves in toward the wheel, the wheel has positive camber. If the air bubble moves out away from the wheel, the wheel has negative camber. In other words, when the gage is compared from top to bottom, the air bubble follows the wheel in or out at the bottom or stays on zero center if the wheel is vertical. The correct camber angle is $1\frac{1}{4}$ to $1\frac{3}{4}$ degrees.

c. **Check Caster** (fig. 43). Place truck on level floor and inflate tires to 40 pounds. Use metal plates under the tires, with a small

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amount of brake fluid on the plates to reduce friction and make the wheels easy to turn. With the gage at the bottom of the wheel, turn the wheels with the steering wheel, moving the gage all the way to the front of the vehicle. With the gage in this forward position, roll the vehicle if necessary to make the gage vertical at the bottom center of the wheel. Set caster dial at zero and level the head by moving it up or down in the friction joint until the bubble is centered. Then turn the wheels all the way in the opposite direction. If necessary, roll the vehicle to bring the gage back to bottom center of wheel. Note the



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Figure 44—Checking Toe-In

bubble; if it has moved in toward the wheel, it is an indication of positive caster. The correct caster, with driver and normal load, is one to two degrees; with no load, zero to one degree.

d. **Check Toe-in, with Gage (fig. 44).** Set wheels in the straight ahead position and place gage between the wheels at the front with ends of gage bearing against side wall of tires and both pendent chains barely touching the ground. Set scale so pointer registers at zero. Then move vehicle forward until gage is brought into position back of the axle with both pendent chains barely touching the ground. The pointer will indicate the amount of toe-in or toe-out.

FRONT AXLE

e. **Adjust Toe-in.** With the front wheels straight ahead, disconnect the left tie-rod end from the steering knuckle and turn the end assembly in the direction necessary to bring the toe-in within 0 to $\frac{1}{8}$ inch. Shorten the tie-rod to decrease the toe-in and lengthen it to increase the toe-in. Install the tie-rod end. Roll vehicle backward or forward at least 10 feet and check the toe-in again to make certain that it is correct.

43. FRONT AXLE REPAIRS (AXLE IN TRUCK).

a. Replacement of Differential and Carrier Assembly.

- (1) Remove wheels and disconnect propeller shaft (par. 44 a).
- (2) Remove hub and drum assemblies (par. 45 a).
- (3) Remove universal drive assemblies (par. 45 b).
- (4) Remove carrier. Remove the nuts which hold the carrier to the housing, and lower the carrier from the axle.
- (5) Install carrier in housing (par. 49 f).
- (6) Install universal drive assemblies (par. 49 g).
- (7) Install hub and drum assemblies (par. 49 h).
- (8) Adjust front wheel bearings (par. 49 i).
- (9) Install wheel and tire assemblies (par. 50 e).
- (10) Connect propeller shaft (par. 39).
- (11) Adjust brake shoes (par. 69 h).

b. Replacement of Universal Drive Assembly.

- (1) Remove wheel and tire assembly (par. 44 a).
- (2) Remove hub and drum assembly (par. 45 a).
- (3) Remove steering knuckle, brake support and drive assembly (par. 45 b).
- (4) Install drive assembly, brake support and steering knuckle (par. 49 g).
- (5) Install hub and drum assembly (par. 49 h).
- (6) Adjust front wheel bearings (par. 49 i).
- (7) Install wheel and tire assembly (par. 50 e).

c. Replacement of Universal Drive Oil Seal and Bushings.

- (1) Remove wheel and tire assembly (par. 44 a).
- (2) Remove hub and drum assembly (par. 45 a).
- (3) Remove steering knuckle, brake support and universal drive assembly (par. 45 b).
- (4) Remove oil seals and bushings by pulling the bushings and oil seal with slide hammer type puller (41-P-2957). Drift the oil seal and bushing into housing and the bushing into the steering knuckle.

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(5) Install universal drive assembly, brake support and steering knuckle (par. 49 g).

(6) Attach dial indicator and move universal drive assembly in and out to check end play. End play should be between 0.013 and 0.049 inch.

(7) Install hub and drum assembly (par. 45 h).

(8) Adjust front wheel bearings (par. 49 i).

(9) Install wheel and tire assembly (par. 50 e).

d. Adjustment of Steering Knuckle Flange Bearings.

(1) Remove wheel and tire assembly (par. 44 a).

(2) Remove hub and drum assembly (par. 45 a).

(3) Remove steering knuckle, brake support and universal drive assembly (par. 45 b).

(4) Remove flange oil seal by removing cap screws which hold steering knuckle flange oil seal to the flange, and remove oil seal.

(5) Remove steering tie-rod (par. 45 c in part).

(6) Disconnect steering drag link (par. 44 b in part).

(7) Adjust flange bearings (par. 49 c).

(8) Connect steering drag link (par. 83 g).

(9) Insert the steering tie-rod ball ends up through the steering arms and install the nuts and cotter pins.

(10) Install steering knuckle flange oil seal (par. 49 e).

(11) Install universal drive assembly, brake support and steering knuckle (par. 49 g).

(12) Install hub and drum assembly (par. 49 h).

(13) Adjust front wheel bearings (par. 49 i).

(14) Install wheel and tire assembly (par. 50 e).

e. Replacement of Steering Knuckle Flange or Bearings.

(1) Remove wheel and tire assembly (par. 44 a).

(2) Remove hub and drum assembly (par. 45 a).

(3) Remove steering knuckle, brake support and universal drive assembly (par. 45 b).

(4) Remove oil flange seal by removing cap screws which hold steering knuckle flange oil seal to the flange, and remove oil seal.

(5) Remove steering tie-rod (par. 45 c in part).

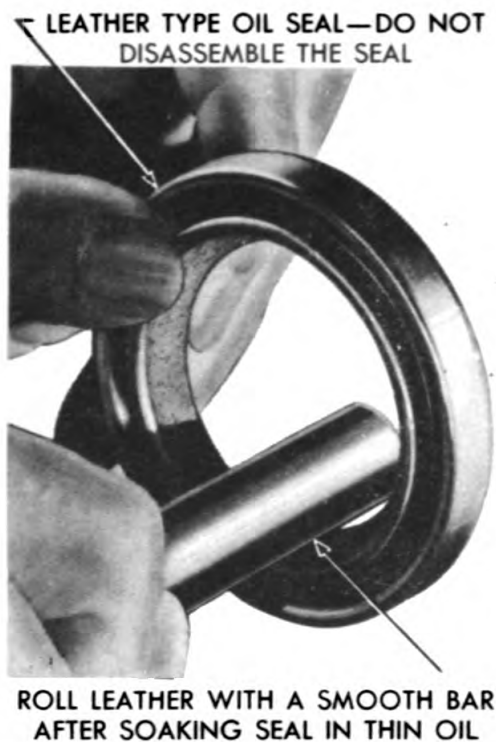
(6) Disconnect steering drag link (par. 44 b in part).

(7) Remove steering knuckle flange (par. 45 d).

FRONT AXLE



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Figure 45—Removing Pinion Bearing Oil Seal**Figure 46—Conditioning Oil Seal for Installation**

- (8) Install steering knuckle flange and bearings (par. 49 b).
- (9) Adjust steering knuckle flange bearings (par. 49 c).
- (10) Connect steering drag link (par. 83 g).
- (11) Insert the steering tie-rod ball ends up through the steering arms and install the nuts and cotter pins.
- (12) Install steering knuckle flange oil seal (par. 49 e).
- (13) Install universal drive assembly, brake support and steering knuckle (par. 49 g).
- (14) Install hub and drum assembly (par. 49 h).
- (15) Adjust front wheel bearings (par. 49 i).
- (16) Install wheel and tire assembly (par. 50 e).

f. Replacement of Pinion Bearing Oil Seal.

(1) **REMOVE OIL SEAL** (fig. 45). Remove the clamp bolts in the universal joint and disconnect the joint. Remove the propeller shaft companion flange nut and the flange. Pull the oil seal from the housing with puller.

(2) **INSTALL OIL SEAL** (fig. 46). Soak the new oil seal in light engine oil for 30 minutes, roll with a smooth bar and install the seal in

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the housing with drift, $\frac{3}{4}$ ton, 4 x 4 (41-R-2395-40); 1½ ton, 6 x 6 (41-D-1535-50). Install the propeller shaft companion flange and nut. Connect the universal joint and install the clamp bolts and nuts.

44. REMOVAL OF FRONT AXLE ASSEMBLY.

a. **Remove Wheels and Disconnect Propeller Shaft.** Raise the front of truck with jack or hoist and place two stands under the front bumper. Remove five large lug nuts which hold wheel to hub. Turn nuts on left wheel clockwise and nuts on right wheel counterclockwise. Then remove the wheel and tire assemblies. Open the universal joint clamp bolt nut locks. Remove the bolts and clamps and slide the joint back on the splines of the propeller shaft.

b. **Disconnect Brake Tube and Steering Drag Link.** Disconnect brake tube from tee on top of axle housing. Remove lubricant fitting and lock wire from front end of steering drag link. Remove the end plug and dust shield. Turn the steering wheel back and forth to loosen the ball socket, and lift the drag link end of the steering arm.

c. **Remove Axle Assembly.** Remove nuts from spring clips and raise the clips out of the spring clip plates. Move the axle assembly from under the truck.

45. DISASSEMBLY OF FRONT AXLE.

a. **Remove Hubs and Drums; Check End Play in Universal Drive (fig. 47).** Turn the tops of the brake shoe adjusting cams toward each other to increase the clearance between the shoes and drums. Remove the nuts which hold the drive flanges to the hubs, and install puller screws. Pull the flanges from the hubs and remove the wheel bearing outer adjusting nuts and adjusting nut locks. Remove the inner adjusting nuts and outer bearings and pull the hubs from the steering knuckles. Attach indicator (fig. 47) and check end play in universal drive assemblies. If the end play exceeds 0.059 inch, replace the housing bushing and the steering knuckle bushing.

b. **Remove Steering Knuckle, Brake Support and Universal Drive Assemblies (fig. 48).** Disconnect the brake hose from the wheel cylinders. Remove the cap screws which hold the steering knuckles and brake supports in place. Tap the knuckles with a hammer and pull them off. Pull the universal drive assemblies straight out (fig. 48). If an inner shaft is broken between the oil seal and four inches from the differential, fish the inner piece out with a wire snare. If breakage is within four inches of differential, remove broken piece after removing differential carrier assembly.

FRONT AXLE

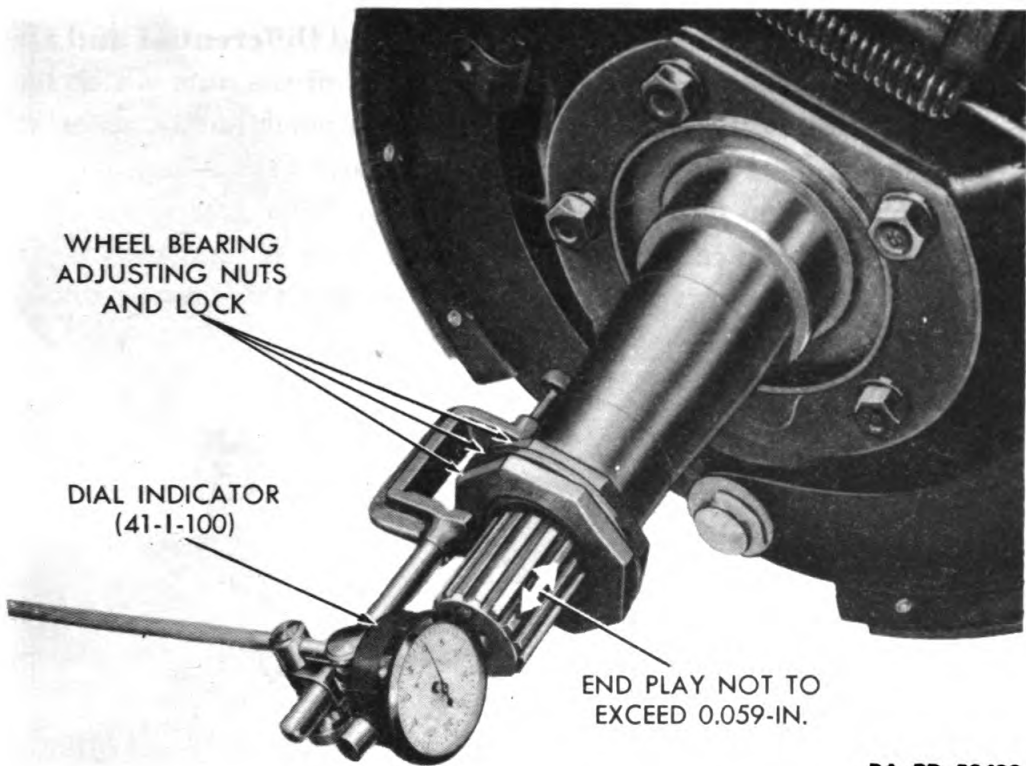


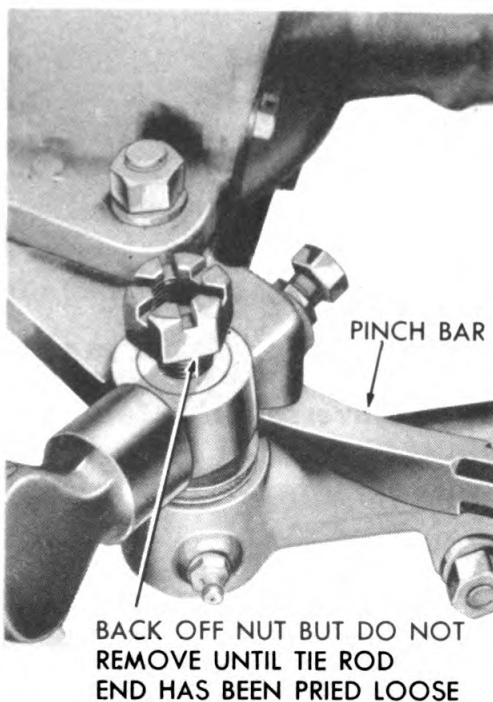
Figure 47—Checking End Play in Universal Drive Shaft



Figure 48—Removing Universal Drive Shaft

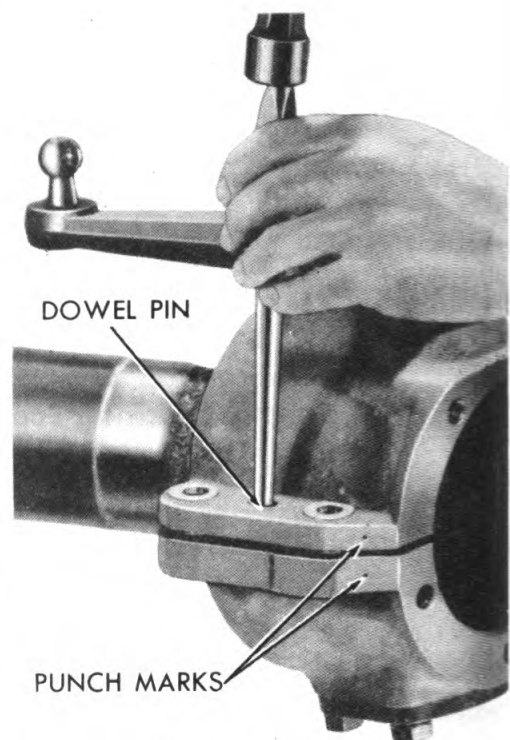
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c. **Remove Steering Tie Rod (fig. 49) and Differential and Carrier Assembly.** Remove cotter pins and back off the nuts which hold the tie rod ends to the steering arms. Insert a pinch bar between the tie rod ends and steering arm and strike the arm with a hammer (fig. 49). Remove drain plug and drain lubricant. Then remove the stud nuts which hold the carrier assembly in the housing, and remove the carrier. Refer to paragraphs 59 and 60 for disassembly, inspection and assembly of differential and carrier assembly.



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**Figure 49—Steering Tie Rod
Removal**

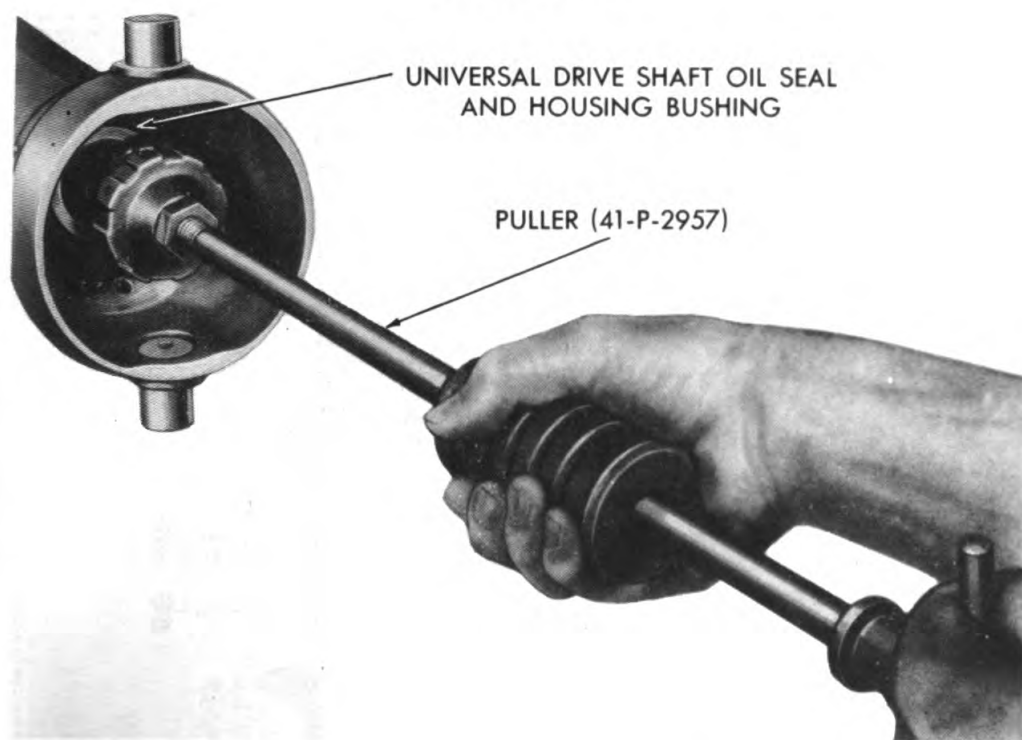


RA PD 53442

**Figure 50—Removing Steering
Knuckle Flange**

d. **Remove Steering Knuckle Flange and Bearing (fig. 50).** Remove the cap screws which hold the steering knuckle flange oil seal retainers to the flanges and remove the oil seals. Mark the upper and lower halves of the flanges to facilitate assembling in the original position. Remove the bolts which hold the upper and lower halves of the flanges together and drive out the dowel pins. Remove the steering knuckles, flanges and bearing cups. Pull the bearing cones off the trunnion pins with puller (41-P-2905-60). Remove the steering arm and bearing cap from the flanges and press out the bearing cups.

FRONT AXLE



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Figure 51—Removing Universal Drive Shaft Oil Seal and Housing Bushing

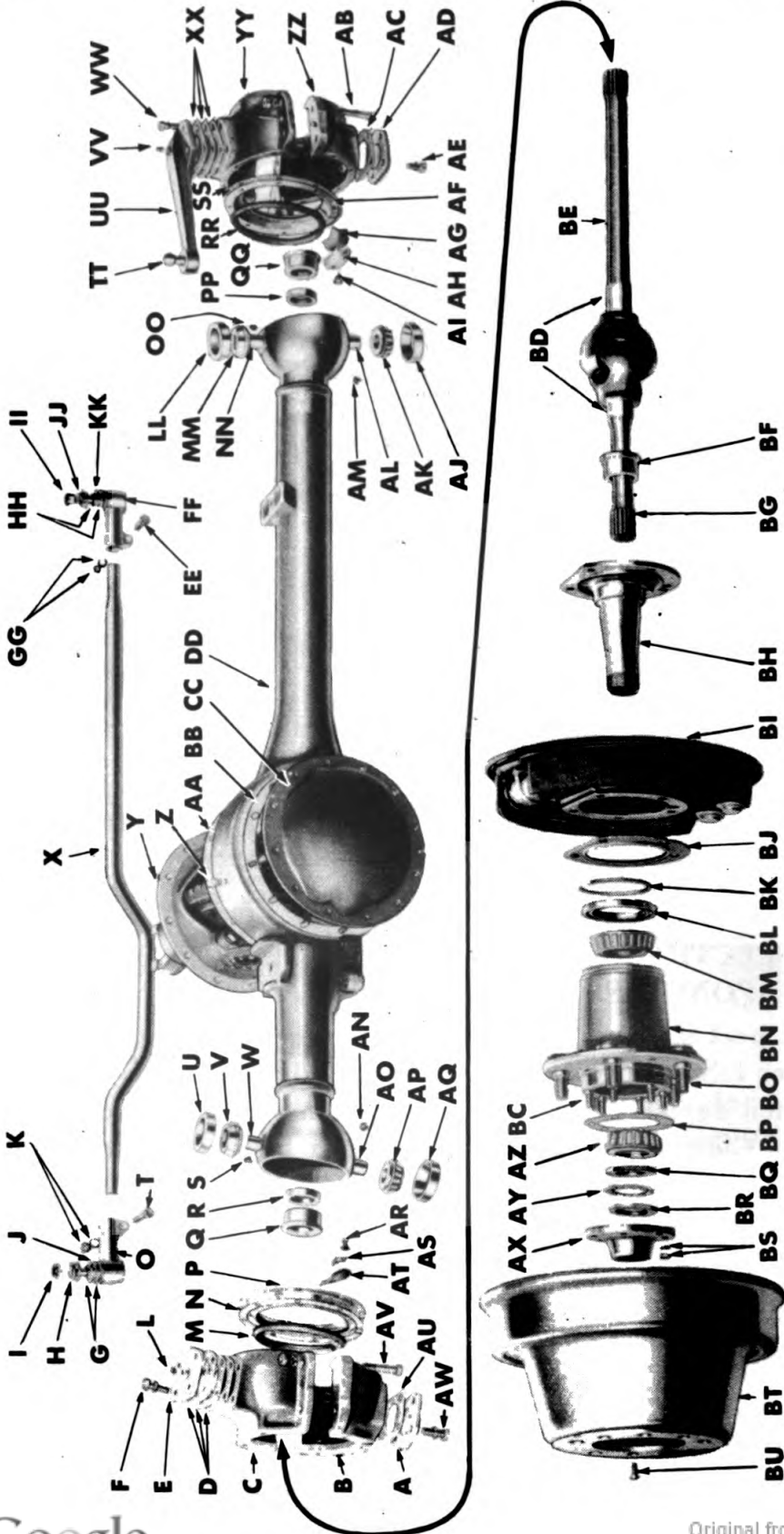
e. **Remove Housing Bushing (fig. 51), Oil Seals and Steering Knuckle Bushings.** Pull the housing bushings and oil seals from the housing and the bushings from the steering knuckles.

46. INSPECTION AND REPAIR OF HOUSING AND COMPONENTS.

a. **Inspect Housing for Leaks or Damage (fig. 52).** Examine the housing for lubricant leakage and damage. Inspect studs and gasket surfaces for damage. Inspect the trunnion sockets for damage or roughness. Clean the steering knuckle flange bearings thoroughly and inspect for chips, cracks or flat spots.

b. **Check Housing Alinement (fig. 53).** With the spring seats in a horizontal position, the top of the axle housing center line tilts forward twelve degrees and fifteen minutes. The top of the pivot pin center line tilts to the front one degree and thirty minutes. (When axle is installed in truck this becomes one degree and thirty minutes positive caster.) The top of the pivot pin center line also tilts toward the center of the axle eight degrees to provide pivot pin angle. If the housing alinement does not meet these specifications, straighten or replace the housing.

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RA PD 53500

Figure 52—Front Axle Disassembled

FRONT AXLE

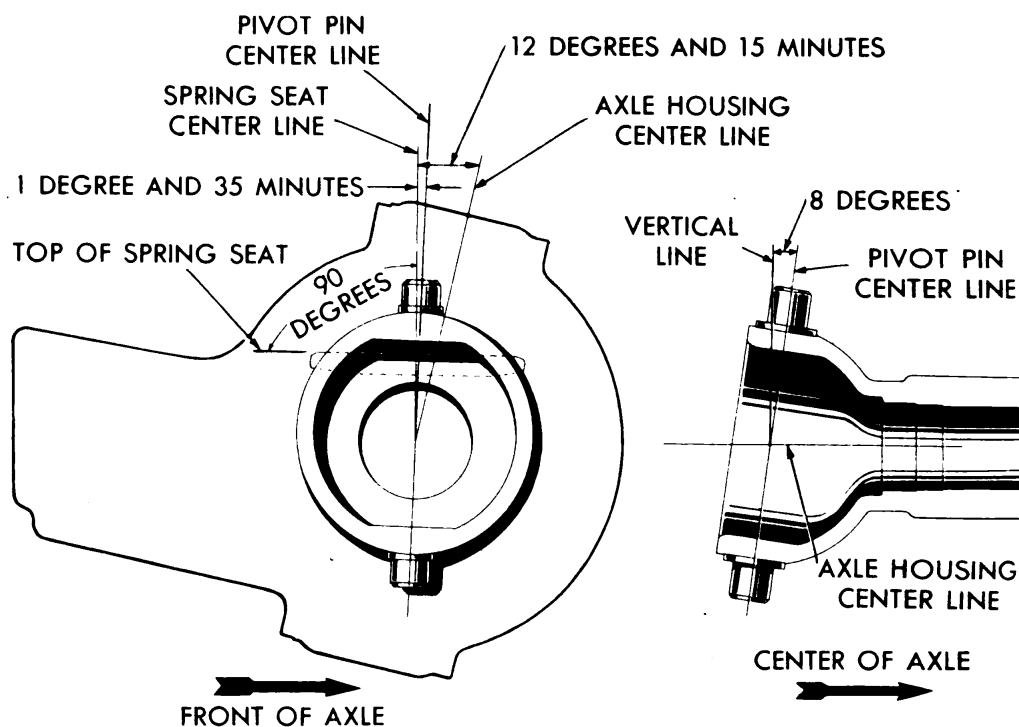
A —FLANGE BEARING CAP—LOWER	GG —NUT AND LOCK WASHER	AN —LUBRICANT PLUG
B —STEERING KNUCKLE FLANGE—LOWER	HH —TIE ROD DUST COVER WASHERS	AO —TRUNNION SOCKET BEARING PIN
C —STEERING KNUCKLE FLANGE—UPPER	II —TIE ROD BALL NUT	AP —FLANGE BEARING CONE—LOWER
D —FLANGE BEARING CAP SHIMS	JJ —TIE ROD DUST COVER SPRING	AQ —FLANGE BEARING CUP—LOWER
E —FLANGE BEARING CAP—UPPER	KK —TIE ROD DUST COVER	AR —SCREW AND LOCK WASHER
F —SCREW AND LOCK WASHER	LL —FLANGE BEARING CUP	AS —JOINT OIL SEAL FELT RETAINER
G —TIE ROD DUST COVER WASHERS	MM —FLANGE BEARING CONE—UPPER	AT —FLANGE JOINT OIL SEAL FELT
H —TIE ROD DUST COVER SPRING	NN —TRUNNION SOCKET BEARING PIN	AU —FLANGE BEARING CAP GASKET
I —TIE ROD BALL NUT	OO —FLANGE BEARING CONE KEY	AV —STEERING KNUCKLE FLANGE BOLT
J —TIE ROD DUST COVER	PP —DRIVE SHAFT OIL SEAL	AW —SCREW AND LOCK WASHER
K —NUT AND LOCK WASHER	QQ —HOUSING BUSHING	AX —DRIVE FLANGE
L —LUBRICANT FITTING	RR —FLANGE OIL SEAL FELT	AY —WHEEL BEARING ADJUSTING NUT LOCK
M —FLANGE OIL SEAL FELT	SS —FLANGE OIL SEAL GASKET	AZ —WHEEL HUB BEARING CONE—OUTER
N —FLANGE OIL SEAL GASKET	TT —STEERING ARM BALL	BC —DRIVE FLANGE STUD
O —TIE ROD END	UU —STEERING ARM	BD —UNIVERSAL DRIVE SHAFT ASSEMBLY
P —FLANGE OIL SEAL RETAINER	VV —LUBRICANT FITTING	BE —UNIVERSAL DRIVE SHAFT—INNER
Q —HOUSING BUSHING	WW —SCREW AND LOCK WASHER	BF —STEERING KNUCKLE BUSHING
R —DRIVE SHAFT OIL SEAL	XX —FLANGE BEARING CAP SHIMS	BG —UNIVERSAL DRIVE SHAFT—OUTER
S —FLANGE BEARING CONE KEY	YY —STEERING KNUCKLE FLANGE—UPPER	BH —STEERING KNUCKLE
T —TIE ROD END CLAMP BOLT	ZZ —STEERING KNUCKLE FLANGE—LOWER	BI —WHEEL BRAKE SUPPORT ASSEMBLY
U —FLANGE BEARING CUP	AB —STEERING KNUCKLE FLANGE BOLT	BJ —WHEEL BRAKE SUPPORT OIL SLINGER
V —FLANGE BEARING CONE—UPPER	AC —FLANGE BEARING CAP GASKET	BK —WHEEL BEARING OIL SEAL SNAP RING
W —TRUNNION SOCKET BEARING PIN	AD —FLANGE BEARING CAP—LOWER	BL —WHEEL BEARING OIL SEAL
X —STEERING TIE ROD	AE —SCREW AND LOCK WASHER	BM —WHEEL HUB BEARING CONE—INNER
Y —DIFFERENTIAL AND CARRIER	AF —FLANGE OIL SEAL RETAINER	BN —WHEEL HUB WITH BEARING CUPS
Z —VENT	AG —FLANGE JOINT OIL SEAL FELT	BO —WHEEL HUB STUD
AA —DRIVE PINION CARRIER GASKET	AH —JOINT OIL SEAL FELT RETAINER	BP —DRIVE FLANGE GASKET
BB —HOUSING COVER GASKET	AI —SCREW AND LOCK WASHER	BQ —WHEEL BEARING ADJUSTING NUT—INNER
CC —HOUSING COVER	AJ —FLANGE BEARING CUP	BR —WHEEL BEARING ADJUSTING NUT—OUTER
DD —HOUSING	AK —FLANGE BEARING CONE—LOWER	BS —NUT AND LOCK WASHER
EE —TIE ROD END CLAMP BOLT	AL —TRUNNION SOCKET BEARING PIN	BT —WHEEL BRAKE DRUM
FF —TIE ROD END	AM —LUBRICANT PLUG	BU —DRUM TO HUB SCREW

RA PD 53500-B

Legend for Figure 52—Front Axle Disassembled

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c. **Inspect Wheel Bearings and Oil Seals (fig. 52).** Remove the wheel bearing oil seals and the inner bearings. Inspect the bearing and cup and, if rough or cracked, replace the damaged parts. Examine the oil seals and the surfaces of the steering knuckles on which the seals bear. If the seals are worn or damaged or the surfaces are rough, replace the damaged seals, using drift (41-D-1535-50). Soak new oil seals in light engine oil and roll the leather seal with a smooth bar.



RA PD 53462

Figure 53—Front Axle Housing Alinement

47. DISASSEMBLY AND INSPECTION OF UNIVERSAL DRIVE.

a. **General.** The universal drive is originally manufactured with a definite amount of preload. The preload will be reduced as normal wear takes place in the parts after a universal drive has been in service for several thousand miles, therefore, the amount of preload can be less than the repair specifications and still the universal drive can be considered satisfactory. While the universal drive assembly will function satisfactorily without preload, it is desirable, if necessary to rebuild an assembly, to select drive balls which will provide the maximum specified preload. The maximum preload in a rebuilt assembly will not occur in the straight ahead position when the ball races are burnished, nor at the full angle at either side, but at some intermediate angular

FRONT AXLE

position just off center, such as from 10 to 15 degrees from the vertical. In testing a universal drive that has been in use for some time, clamp the assembly in a vise with the long shaft down. Push the short shaft down firmly and try to twist the short shaft in one direction and then in the other direction. If any play exists, disassemble the joint for further inspection of the parts.

b. Disassemble Universal Drive (fig. 54). Drive the thrust ball pin lock out of the drive assembly (1, fig. 54). Hold the drive assembly vertical with the short end down. Bounce the end of the short shaft on a block of wood to dislodge the drive thrust ball pin (2, fig. 54). If the lubricant causes the ball pin to stick so it does not drop down and release the ball, insert a wire or punch into the lock pin hole and move the pin down until the ball is released. Then clamp the short shaft in a vise and swing the long shaft to one side. At the same time, raise the long shaft to pull the two sections slightly apart. Turn the drive thrust ball with the fingers so the groove in it lines up with one of the drive balls (3, fig. 54). Remove the drive ball with the fingers. The remaining drive balls and the drive thrust ball will drop out and the two sections of the drive assembly will separate. Turn the short shaft with the universal end down and the thrust ball pin will drop out of the shaft.

c. Clean Parts. Wash all parts of the universal drive with dry-cleaning solvent, and dry with compressed air.

d. Inspect Drive Thrust Ball and Drive Balls (fig. 54). Measure the drive balls with a micrometer (4, fig. 54), to determine if they are round and smooth. Replace the individual parts, if any one of the four driving balls or the center ball shows evidence of excessive wear, cracks or flat spots. Balls that are found in good condition but are being replaced with larger balls, should be saved for installation in an assembly requiring that particular size. Drive balls are available in the following sizes:

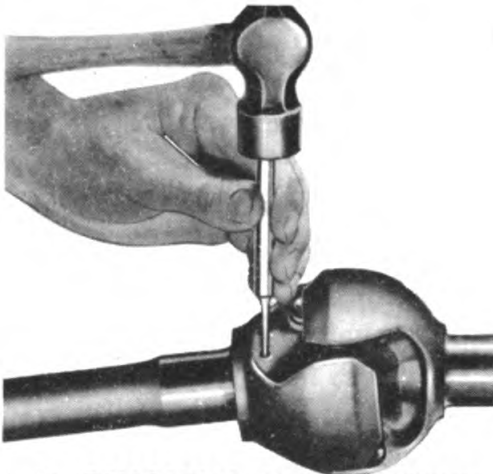
1.156-in.—standard size

1.159—0.003-in. oversize	1.155—0.001-in. undersize
1.158—0.002-in. oversize	1.154—0.002-in. undersize
1.157—0.001-in. oversize	1.153—0.003-in. undersize

A selective fit is not required for the center ball or center ball pin, therefore, these parts are supplied in one size only. Replace the ball pin if it is worn or damaged.

e. Inspect Drive Shafts. Examine the yokes of both drive shafts carefully for chips or cracks in the ball races. Replace the shaft if there is any evidence of chipping or cracking of the metal, of the yoke or any other part of the shaft. A brinelled spot across the ball race, cor-

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**1—REMOVING DRIVE THRUST
BALL LOCK PIN**



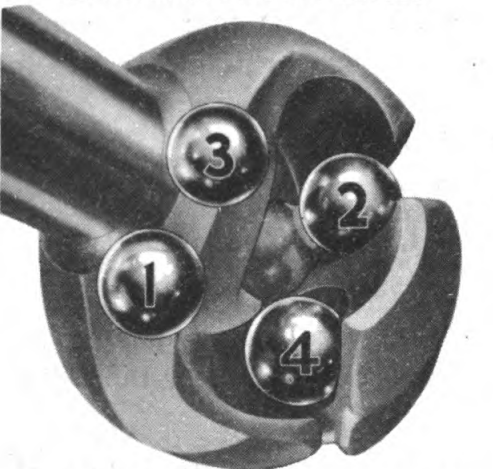
**2—DISLODGING DRIVE THRUST
BALL PIN**



**3—REMOVING OR INSTALLING
UNIVERSAL DRIVE BALLS**



**4—MEASURING DRIVE BALLS
WITH MICROMETER**



**5—DRIVE BALL INSTALLATION
DIAGRAM**



**6—INSTALLING DRIVE THRUST
BALL PIN**

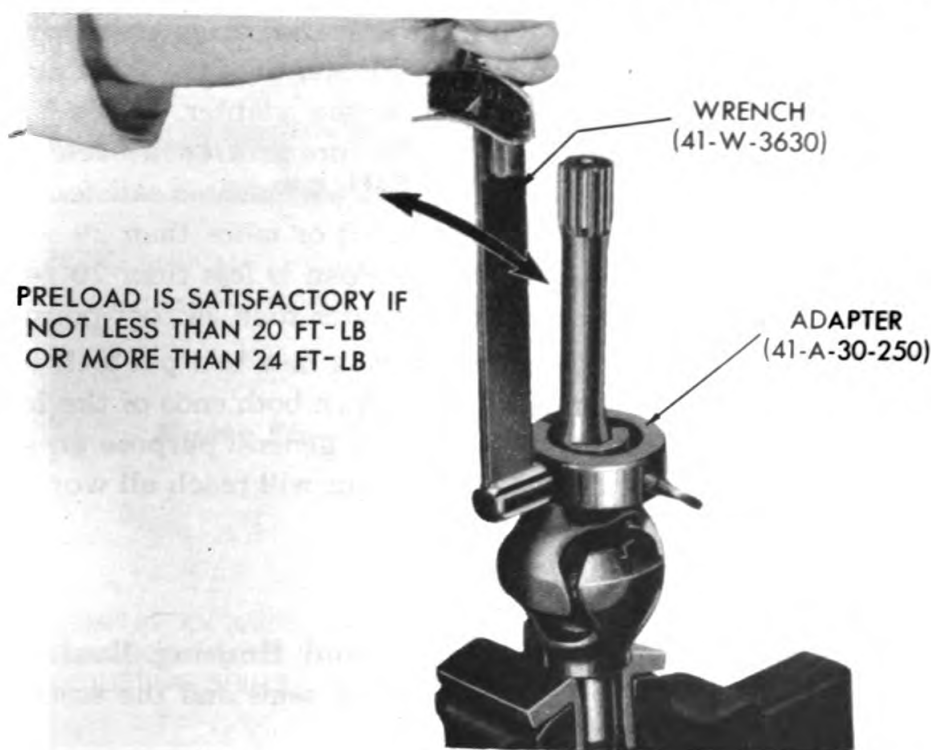
RA PD 53448

FRONT AXLE

responding to the shaft position with the front wheels straight ahead, may be evident to some extent on all yokes. However, it will not prove harmful until the wear allows play in the universal drive assembly, sufficient to be felt in the straight ahead position, with the maximum specified preload on either side of the vertical or straight position.

48. ASSEMBLY OF UNIVERSAL DRIVE.

a. **Assemble Universal Drive (fig. 54).** Clean the universal drive parts thoroughly before assembling the parts. Measure the diameter of



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Figure 55—Testing Universal Drive Preload

the original drive balls with a micrometer (4, fig. 54). Select one or two new balls 0.001 inch larger than the smallest ball originally used in the assembly. It is desirable to keep the drive balls within 0.001 inch of the same size and the variation must not exceed 0.002 inch. As the joint is being assembled, place the two largest balls diagonally across from each other, as shown at 1 and 2, or 3 and 4, in figure 54. Clamp the short shaft in a vise with the universal joint section at the top. Then install the center ball pin, (6, fig. 54). Install the center ball in the socket on the end of the short shaft and then place the long shaft in position on the ball. Install three of the drive balls. To install the fourth drive ball, turn the center ball to bring the groove toward the

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adjacent driving ball about to be installed. Push the fourth driving ball into place. Straighten up the long shaft and remove the universal drive assembly from the vise; then clamp the long shaft in the vise with the short shaft at the top. Swing the short shaft sideways and lift it slightly to loosen the center ball and then turn the center ball to aline the hole in it with the center ball pin in the end of the short shaft, allowing the pin to drop into position in the ball. Push the two sections of the drive assembly together firmly. This will apply a pressure on the drive balls, if the balls are not too small.

b. Test Preload (fig. 55). Mount the universal drive assembly in a vise by the long or inner shaft, place the adapter over the short outer shaft and tighten. Attach torque wrench to the adapter. Force both sections of the joint together and move the torque wrench back and forth and read preload on wrench scale. The assembly is satisfactory if the preload is not less than 20 foot-pounds or more than 24 foot-pounds. Install larger drive balls if the preload is less than 20 foot-pounds or smaller balls if the preload is greater than 24 foot-pounds.

c. Lock Ball Pin and Lubricate. Drive a new ball pin lock into the joint end of the short shaft and center-punch both ends of the lock to hold it in position. Lubricate the joint with general purpose grease. Move the joint while lubricating it so lubricant will reach all working surfaces of the balls and ball races.

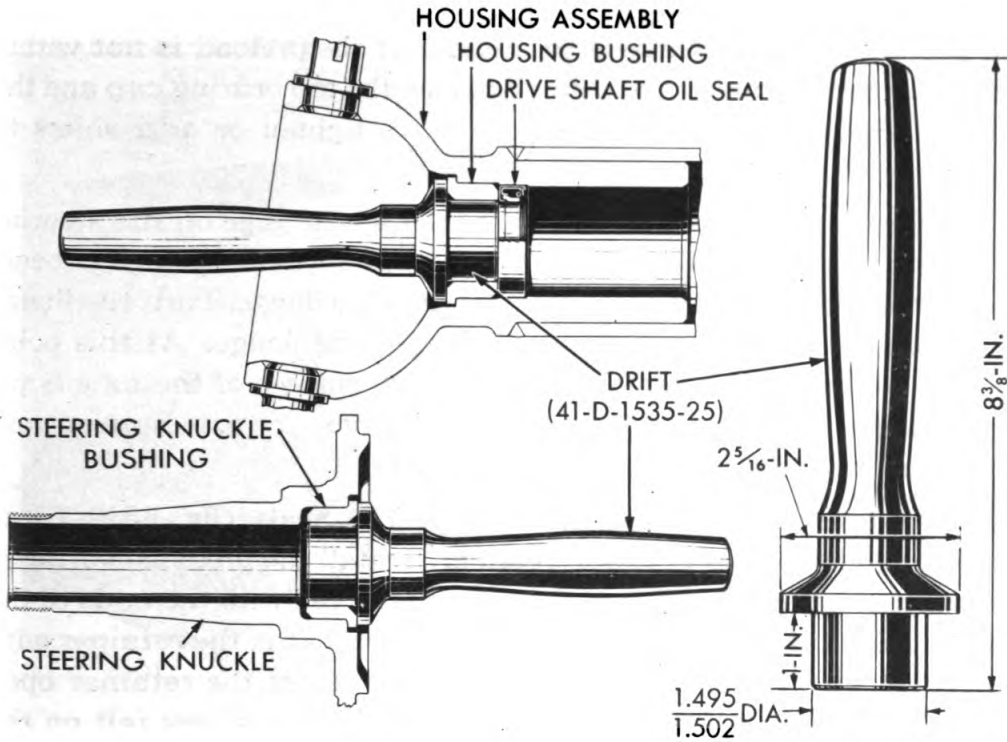
49. ASSEMBLY OF FRONT AXLE.

a. Install Universal Drive Oil Seals and Housing Bushings (fig. 56). Install the housing bushings and oil seals and the steering knuckle bushings with a drift.

b. Install Steering Knuckle Flanges and Bearings (fig. 54). Install the key in the upper trunnion socket pin. Coat the bearings with lubricant and install them on the trunnion socket pins. Press the bearing cups into the steering knuckle flanges. Place the upper and lower halves of the knuckle flanges in position and install the bolts and nuts, but do not tighten until the dowel pins have been installed to line up the flanges. Install the lower steering knuckles, bearing caps and gaskets. Install the adjustment shims and top bearing caps. Adjust bearing as outlined in the following paragraph.

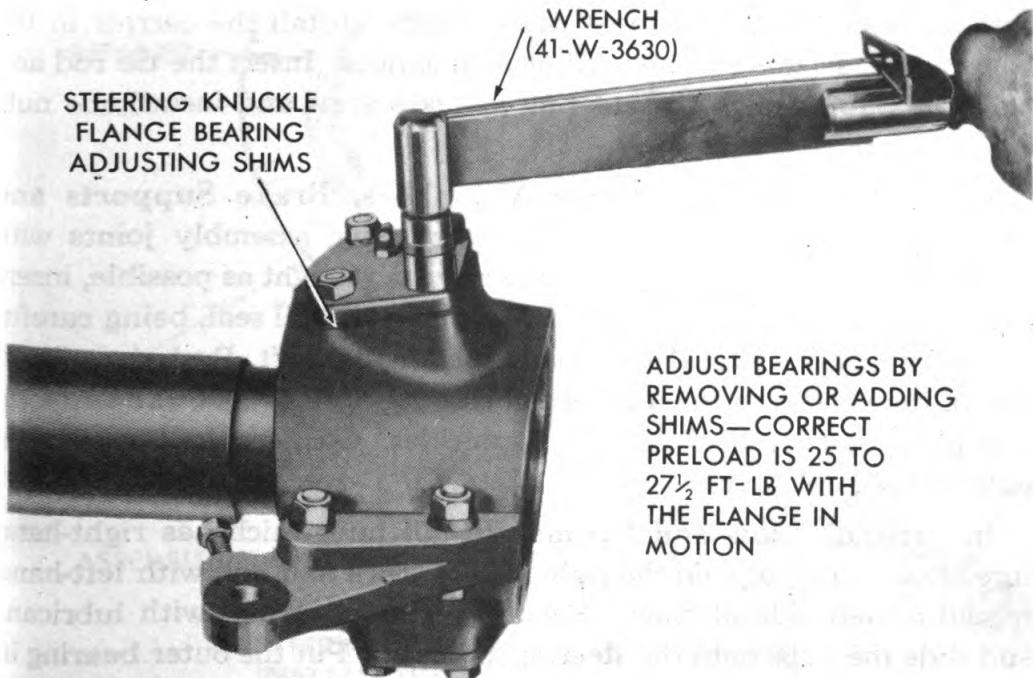
c. Adjust Steering Knuckle Flange Bearings (fig. 57). Make sure that bearing caps and bearings are seated by tapping with a hammer. Check the preload of the bearings with a foot-pound torque wrench attached to one of the cap screws of the steering knuckle flange bearing cap. The torque wrench reading should be from 25 to 27½

FRONT AXLE



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Figure 56—Oil Seal and Bushing Installation



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Figure 57—Adjusting Steering Knuckle Flange Bearing

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foot-pounds while the flange is in motion. If the preload is not within specifications, remove or add shims between the top bearing cap and the steering knuckle flange. Remove shims to tighten or add shims to loosen the bearings.

d. **Check Turning Radius** (fig. 58). Lay the gage on the steering knuckle flange (1, fig. 58), so that the recessed portion of the gage bears against machined surface of the steering knuckle flange. Turn the flange until the gage restricts further movement of the flange. At this point the gage will also bear against the machined surface of the axle housing. Adjust the stop screw so that it bears against the axle housing and tack-weld the screw and lock nut (2, fig. 58).

e. **Install Steering Knuckle Flange Oil Seals** (fig. 58). Clean the sealing surfaces and the seal retainer. Install the pressure spring in the retainer so that the ends of the spring are even with the ends of the retainer. Soak the felt seal in light oil and install it in the retainer with the ends even with the ends of the retainer. Twist the retainer open at the joint and put it over the axle housing. Place a new felt on the joint seal retainer and a new gasket on the steering knuckle flange.

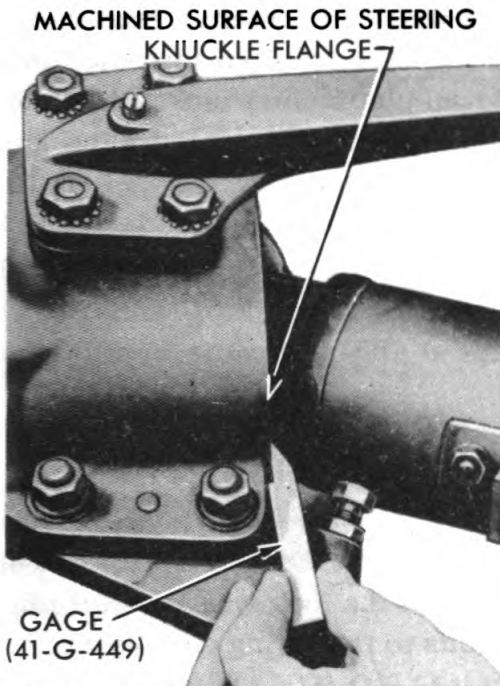
f. **Install Differential Carrier and Tie Rod.** If the differential side bearing caps are attached with cap screws, place one new gasket over the housing studs. If the differential side bearing caps are attached with studs and nuts, use three new gaskets. Install the carrier in the housing and securely tighten all attaching nuts. Insert the tie rod and ball studs up through the steering knuckle arms and install the nuts and cotter pins.

g. **Install Universal Drive Assemblies, Brake Supports and Steering Knuckles.** Pack the universal drive assembly joints with lubricant and while holding the assembly as straight as possible, insert the long shaft through the trunnion bushing and oil seal, being careful not to damage the oil seal with the splines on the shaft. Push the splined end of the shaft into the differential side gear. Put the brake supports into place and install the steering knuckles. Connect the brake tubes to the brake cylinders.

h. **Install Hubs and Drums.** Install hub which has right-hand thread on wheel lugs, on the right side of truck and hub with left-hand thread on left side of truck. Pack the wheel bearings with lubricant and slide the hubs onto the steering knuckles. Put the outer bearing in place and install the bearing adjusting inner nut.

i. **Adjust Wheel Bearings.** Turn the inner adjusting nut up tight and then back it off about $\frac{1}{6}$ of a turn. Install the adjusting nut lock,

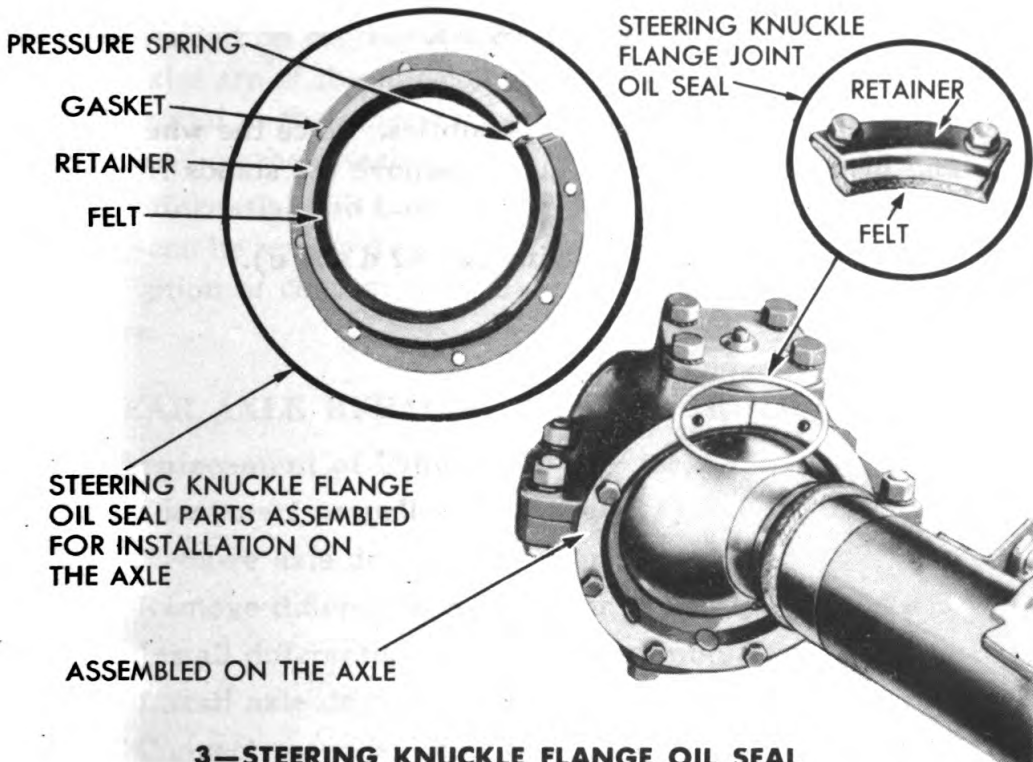
FRONT AXLE



1—CHECKING TURNING RADIUS



2—STEERING KNUCKLE STOP SCREW



3—STEERING KNUCKLE FLANGE OIL SEAL INSTALLATION

RA PD 53461

Figure 58—Checking Turning Radius and Installing Flange Oil Seal

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making sure that the dowel pin in the inner nut enters a hole in the lock. It may be necessary to turn the lock over or even turn the inner adjusting nut slightly to permit the dowel pin to enter one of the holes in the lock. With the lock over the dowel pin, install the outer nut and tighten it securely. Install the drive flange with a good gasket and securely tighten the attaching nuts.

j. Fill Axle with Lubricant. Remove filler plug and fill with lubricant until $\frac{1}{2}$ inch below filler hole with axle and lubricant at room temperature (70° F.). Do not overfill as this will cause overheating and lubricant leakage.

50. INSTALLATION OF FRONT AXLE ASSEMBLY.

a. Install Axle and Connect Shock Absorbers. Move the axle under the truck and raise it into position against the front springs. Tap the spring clips down into place and install the lock washers and nuts. Connect the shock absorber link eye bolts to the spring clip plates.

b. Connect Brake Tube, Drag Link and Propeller Shaft. Connect the brake tube to the tee on top of the axle housing, attach the drag link to the steering knuckle and connect propeller shaft (par. 39).

c. Adjust Brake Shoes (par. 69 h).

d. Bleed Brake System (par. 77 c).

e. Install Wheel and Tire Assemblies. Place the wheels on the hubs and install the wheel lug nuts. Remove the stands from under the bumper.

f. Adjust Front Wheel Toe-in (par. 42 d and e).

CHAPTER 2

POWER TRAIN (Cont'd)

Section VIII

REAR AXLE

	Paragraph
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Rear axle repairs (axle in truck)	52
Removal of rear axle assembly	53
Disassembly of rear axle	54
Inspection and repair of housing and components	55
Assembly of rear axle	56
Installation of rear axle assembly	57

51. DESCRIPTION OF CONSTRUCTION.

a. **Rear Axle Assembly** (fig. 59). The $\frac{3}{4}$ ton, 4 x 4 trucks are equipped with one rear axle. The $1\frac{1}{2}$ ton, 6 x 6 trucks have two rear axles suspended on cantilever springs and supported by torque links. All rear axles are of the full floating type. Power is transmitted from the differential to the wheels by drive shafts which may be removed with the load on the wheels.

b. **Differential and Carrier** (fig. 59). The differential and carrier assembly can be removed as a unit. Refer to paragraphs 58, 59 and 60 for description of construction, disassembly, inspection and assembly procedure.

52. REAR AXLE REPAIRS (AXLE IN TRUCK).

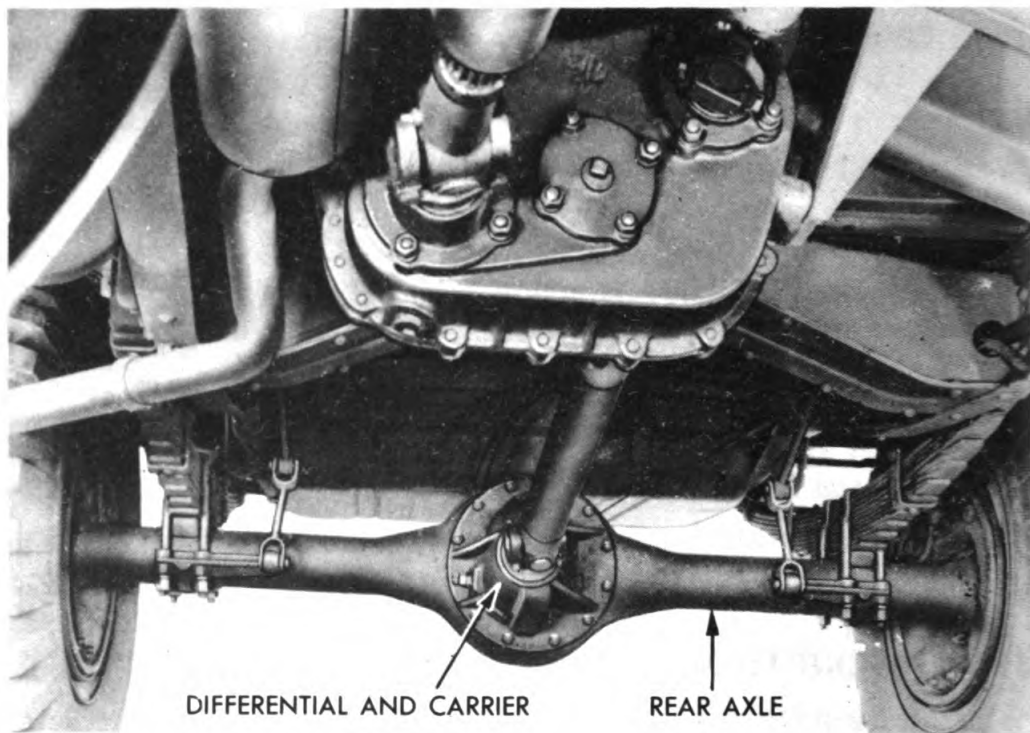
a. Replacement of Differential Carrier.

- (1) Disconnect propeller shaft (par. 37).
- (2) Remove axle drive shafts (par. 54 a).
- (3) Remove differential and carrier assembly (par. 54 e).
- (4) Install differential and carrier assembly (par. 56 e).
- (5) Install axle drive shafts (par. 56 f).
- (6) Connect propeller shaft (par. 39).

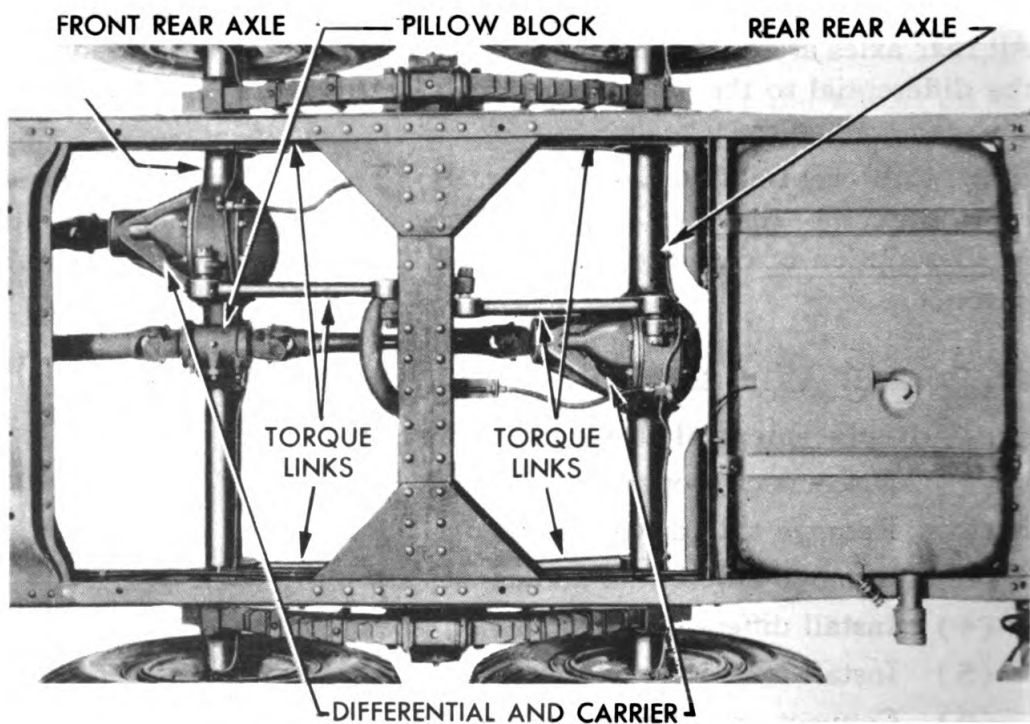
b. Replacement of Axle Drive Shaft.

- (1) Remove axle drive shaft (par. 54 a).
- (2) Install axle drive shaft (par. 56 f).

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$\frac{3}{4}$ TON, 4 x 4



1½ TON, 6 x 6

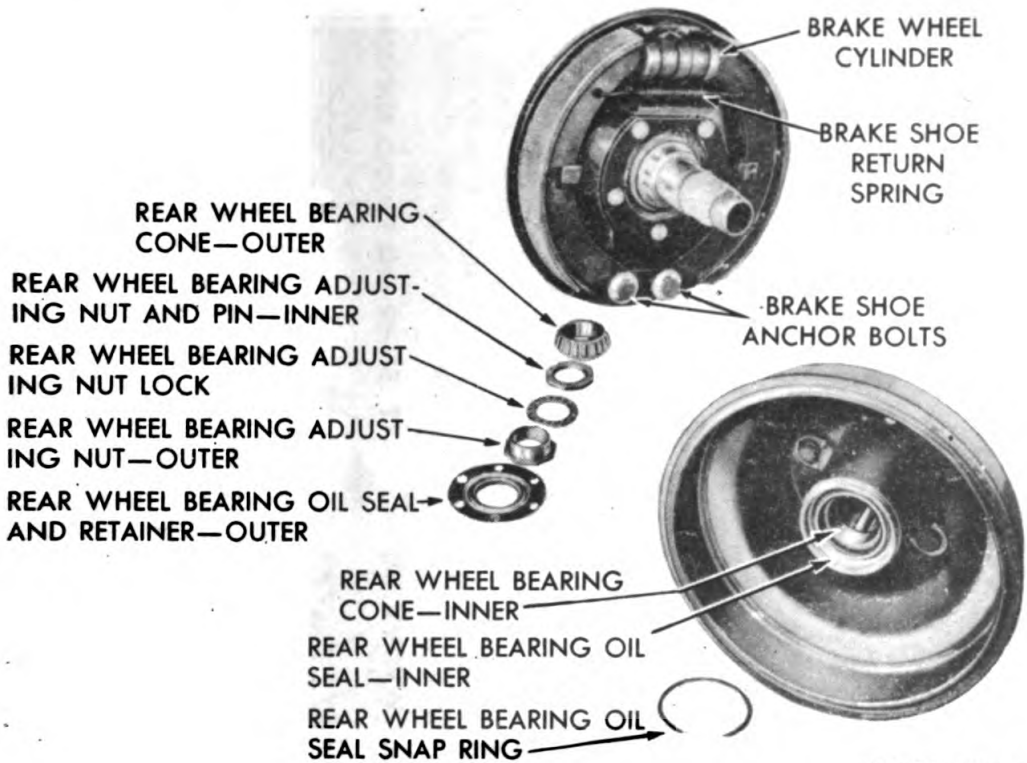
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Figure 59—Rear Axles

REAR AXLE

c. Replacement of Wheel Bearing Oil Seals.

- (1) Remove axle drive shaft (par. 54 a).
- (2) Remove hubs and drums (par. 54 b).
- (3) Remove oil seal (par. 54 c in part).
- (4) Install oil seals (par. 56 b in part).
- (5) Install hubs and drums (par. 56 c).
- (6) Adjust wheel bearings (par. 56 d).
- (7) Install outer oil seal and drive shaft (par. 56 f).



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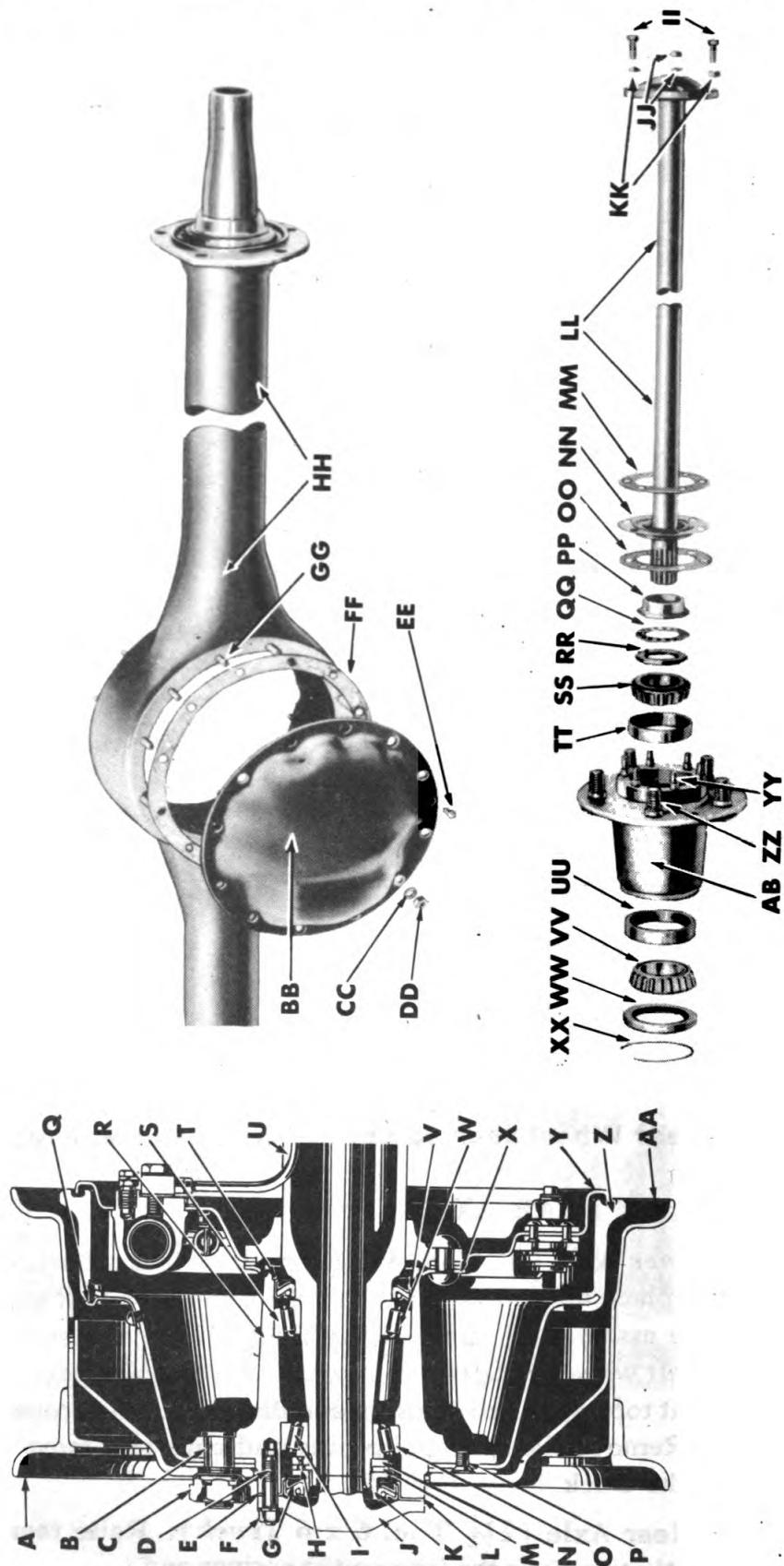
Figure 60—Rear Wheel Bearing and Oil Seal Disassembled

53. REMOVAL OF REAR AXLE ASSEMBLY.

a. Remove Rear Axle ($\frac{3}{4}$ Ton, 4 x 4 Truck). Jack wheels free of the ground and place a stand under each side of the frame. Remove the wheel and tire assemblies, turn nuts on right wheel counterclockwise and nuts on left wheel clockwise to remove. Disconnect the brake hose from the tee at top of the axle housing and disconnect the propeller shaft (par. 37). Remove the spring clip nuts and clips and move the axle from under the truck.

b. Remove Rear Axle (1½ Ton, 6 x 6 Truck). Raise rear of the frame sufficiently to relieve the load on the springs and place stands

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Figure 61—Rear Axle Disassembled (Less Differential and Carrier Assembly)

REAR AXLE

A —WHEEL SIDE RING	AA —WHEEL
B —WHEEL HUB STUD	BB —HOUSING COVER
C —WHEEL HUB STUD NUT	CC —HOUSING COVER STUD NUT LOCK WASHER
D —DRIVE SHAFT STUD	DD —HOUSING COVER STUD NUT
E —DRIVE SHAFT GASKET	EE —DRAIN PLUG
F —DRIVE SHAFT STUD NUT AND LOCK WASHER	FF —HOUSING COVER GASKET
G —WHEEL BEARING OIL SEAL—OUTER	GG —HOUSING COVER STUD
H —WHEEL BEARING ADJUSTING NUT PIN	HH —HOUSING
I —WHEEL HUB BEARING CONE—OUTER	II —PULLER SCREWS
J —DRIVE SHAFT	JJ —DRIVE SHAFT STUD NUT AND LOCK WASHER
K —WHEEL BEARING ADJUSTING NUT—OUTER	KK —PULLER SCREW LOCK NUTS
L —DRIVE SHAFT GASKET	LL —DRIVE SHAFT
M —WHEEL BEARING ADJUSTING NUT LOCK	MM —DRIVE SHAFT GASKET
N —WHEEL BEARING ADJUSTING NUT—INNER	NN —WHEEL BEARING OIL SEAL—OUTER
O —WHEEL HUB BEARING CUP—OUTER	OO —DRIVE SHAFT GASKET
P —WHEEL BRAKE DRUM SCREW	PP —WHEEL BEARING ADJUSTING NUT—OUTER
Q —WHEEL BRAKE DRUM INSPECTION HOLE COVER	QQ —WHEEL BEARING ADJUSTING NUT LOCK
R —WHEEL HUB	RR —WHEEL BEARING ADJUSTING NUT—INNER
S —WHEEL HUB BEARING CUP—INNER	SS —WHEEL HUB BEARING CONE—OUTER
T —WHEEL BEARING OIL SEAL SNAP RING	TT —WHEEL HUB BEARING CUP—OUTER
U —HOUSING	UU —WHEEL HUB BEARING CUP—INNER
V —WHEEL BEARING OIL SEAL—INNER	VV —WHEEL HUB BEARING CONE—INNER
W —WHEEL HUB BEARING CONE—INNER	WW —WHEEL BEARING OIL SEAL—INNER
X —WHEEL BRAKE OIL SLINGER	XX —WHEEL BEARING OIL SEAL SNAP RING
Y —WHEEL BRAKE SUPPORT	YY —DRIVE SHAFT STUD
Z —WHEEL BRAKE DRUM	ZZ —WHEEL HUB STUD
	AB —WHEEL HUB

RA PD 53503-B

Legend for Figure 61—Rear Axle Disassembled (Less Differential and Carrier Assembly)

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under the frame. Disconnect brake hose at the frame cross member, screw the brake hose from the tee at the axle housing. Disconnect spring torque links by removing the large nuts and driving the tapered ball studs from the brackets with a brass drift and hammer. Disconnect propeller shaft from companion flange at drive pinion (par. 37). Remove pillow block from axle housing (fig. 59—front rear axle only). Remove wheel and tire assemblies and move axle off end of springs and from under truck.

54. DISASSEMBLY OF REAR AXLE.

a. **Remove Axle Drive Shafts** (fig. 61). Remove the nuts which hold the drive shaft flanges to the hubs. Remove the lock nuts from the puller screws and use the screws to pull the shafts from the axle.

b. **Remove Hubs and Drums** (figs. 60 and 61). Turn the brake shoe adjusting cams toward each other to increase the clearance between the brake shoes and drums. Remove the wheel bearing outer oil seals (NN, fig. 61) and adjusting nuts (PP, fig. 61) and pull off the hub and drum assemblies.

c. **Remove Wheel Bearings and Drums from Hubs** (figs. 60 and 61). Remove the inner oil seal snap ring from inner end of the hub. Drift the inner bearing and oil seal from the hub, then drift both bearing cups from the hub. Remove three large countersunk screws which hold the drum to the hub and use puller screws to pull the drum from the hub.

d. **Remove Brake Shoes and Wheel Brake Cylinder** (fig. 60). Disconnect brake tube from wheel cylinder and remove nuts from inner end of brake shoe anchor bolts. Disconnect brake shoe return spring and remove brake shoes. Remove two attaching cap screws and remove the wheel brake cylinder.

e. **Remove Differential and Carrier Assembly.** Remove drain plug and drain lubricant. Remove the attaching stud nuts and lower the assembly from the axle housing. Refer to paragraphs 59 and 60 for disassembly, inspection and assembly procedure.

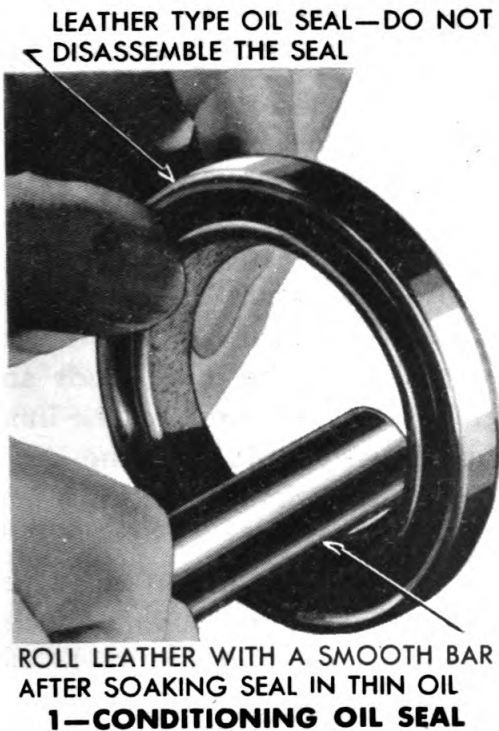
55. INSPECTION AND REPAIR OF HOUSING AND COMPONENTS.

a. **Inspect Housing for Leaks or Damage** (fig. 61). Examine the housing for lubricant leaks and damage. Inspect studs and gasket surfaces for damage. Inspect brake support and if loose or damaged, tighten rivets or replace. Check the axle housing for alinement and if bent or twisted, straighten or replace housing.

REAR AXLE

56. ASSEMBLY OF REAR AXLE.

a. **Install Brake Shoes and Brake Wheel Cylinder (fig. 60).** Place the wheel cylinder in place and install the attaching cap screws. Connect the brake tube to the cylinder. Place the brake shoes in position with the anchor bolts through the brake support. Turn the anchor bolts so that the prick punch marks on the inner end of the bolts are toward each other and install the anchor bolt lock nuts. Install the brake shoe return spring.



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Figure 62—Conditioning and Installing Rear Wheel Bearing Oil Seal

b. **Install Hubs, Wheel Bearings and Inner Oil Seal (fig. 62).** Install the large countersunk screws which hold the drums to the hubs. Install inner and outer bearing cups in hub, thick edge first. Pack the inner bearing cone with wheel bearing grease and place the bearing cone in the bearing cup. Work the oil seal, after soaking in thin oil, by rolling with pressure applied by a smooth bar (1, fig. 62). Install the seal in the hub (2, fig. 62). Install the oil seal snap ring.

c. **Install Hubs and Drums (fig. 61).** Install hub, which has right thread on the wheel lugs, on the right side of truck, and hub with left-hand threads on left side of truck. Slide the hub and drum straight onto the axle housing. Exercise care to prevent damaging the oil seal. Pack the outer wheel bearing cone with wheel bearing grease and install the bearing and inner bearing adjusting nut on the housing.

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d. **Adjust Wheel Bearings.** Turn the inner adjusting nut up tight and then back it off about $\frac{1}{6}$ of a turn. Install the adjusting nut lock, making sure that the dowel pin in the inner adjusting nut enters a hole in the lock. It may be necessary to turn the lock over or even turn the inner adjusting nut slightly to permit the dowel pin to enter one of the holes in the lock. With the lock over the dowel pin, install the outer adjusting nut and tighten it securely.

e. **Install Differential and Carrier Assembly.** Place one new gasket over the housing studs, install the carrier assembly and securely tighten the attaching nuts.

f. **Install Outer Oil Seals and Drive Shafts (fig. 61).** Soak the oil seal in engine oil to make it pliable. Clean the outer end of the wheel hub and drive shaft studs. Install a good paper gasket over the drive studs. Inspect the wheel bearing outer adjusting nut (PP, fig. 61). If the oil seal bearing surface is rough or grooved, replace the nut. Install the outer oil seal (NN, fig. 61) over the adjusting nut and the axle shaft drive studs. Place a new gasket on the drive studs and install the drive shaft in the housing. Engage the splines on the inner end of the shafts with the differential side gears and push the shafts into place. Install standard lock washers and flange attaching nuts on the drive studs and tighten evenly.

g. **Fill Axle with Lubricant.** Remove filler plug and fill with lubricant until $\frac{1}{2}$ inch below filler hole, axle and lubricant at room temperature (70° F). Do not overfill as this will cause overheating and loss of lubricant.

57. INSTALLATION OF REAR AXLE ASSEMBLY.

a. **Install Rear Axle ($\frac{3}{4}$ Ton, 4 x 4 Truck).** Raise the axle assembly into contact with the rear springs. Make certain that the spring center bolts enter the holes in the spring seats on the axle housing. Install the spring clips with standard lock washers and tighten the nut securely. Connect the universal joint (par. 39). Connect brake hose to tee on axle housing and bleed brake system (par. 77 c). Place the wheels over the hubs and install the wheel lug nuts. To tighten, turn nuts on right side clockwise, and nuts on left side counterclockwise.

b. **Install Rear Axle (1½ Ton, 6 x 6 Truck).** Raise the axle and move it into position over the ends of the springs. Place the wheels over the hubs and install wheel lug nuts and connect the propeller shaft (par. 39). Install the pillow block to the axle housing (front rear axle only). Insert the tapered ball studs of the spring torque links through the brackets and install the nuts and cotter pins. Install the brake hose and bleed the brake system (par. 77 c).

CHAPTER 2

POWER TRAIN (Cont'd)

Section IX

DIFFERENTIAL AND CARRIER ASSEMBLY (FRONT AND REAR AXLES)

	Paragraph
Description of construction	58
Disassembly and inspection of differential carrier	59
Assembly of differential carrier	60

58. DESCRIPTION OF CONSTRUCTION.

a. **Differential** (fig. 63). Both two- and four-pinion type differentials are used in the $\frac{3}{4}$ ton, 4 x 4 truck. All $1\frac{1}{2}$ ton, 6 x 6 trucks are equipped with four-pinion differentials. The differential assembly is carried on two tapered roller bearings which are adjustable. The differential lubricant is confined to the differential and drive pinion sections of the axle housing by the drive pinion bearing oil slinger, the drive pinion oil seal and the universal drive shaft oil seal.

b. **Drive Pinion** (fig. 63). The differential drive pinion of the $\frac{3}{4}$ ton, 4 x 4 truck, prior to truck serial number 81657582 and from 81674101 through 81674747, is mounted on two tapered roller bearings. The differential drive pinion of the $\frac{3}{4}$ ton, 4 x 4 truck after serial number 81657582, except from 81674101 through 81674747 and the $1\frac{1}{2}$ ton, 6 x 6 truck, is mounted on a single race tapered roller inner bearing and a double race tapered roller outer bearing. The large type differential carrier assembly as indicated for the $1\frac{1}{2}$ ton, 6 x 6 truck entered production on the $\frac{3}{4}$ ton, 4 x 4 truck after the serial numbers mentioned above. The adjustment of pinion bearings on both models is controlled by a spacer on the pinion shaft.

c. **Thrust Pad** (fig. 74). A thrust pad is mounted in the differential carrier housing back of the drive gear to prevent distortion of the drive gear when extreme torque, or driving force, is suddenly applied to the axle.

59. DISASSEMBLY AND INSPECTION OF DIFFERENTIAL CARRIER.

a. **Remove Differential Assembly and Drive Gear.** Hold the propeller shaft companion flange with wrench (41-W-1978-950), re-

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND $1\frac{1}{2}$ TON 6 x 6 (DODGE)

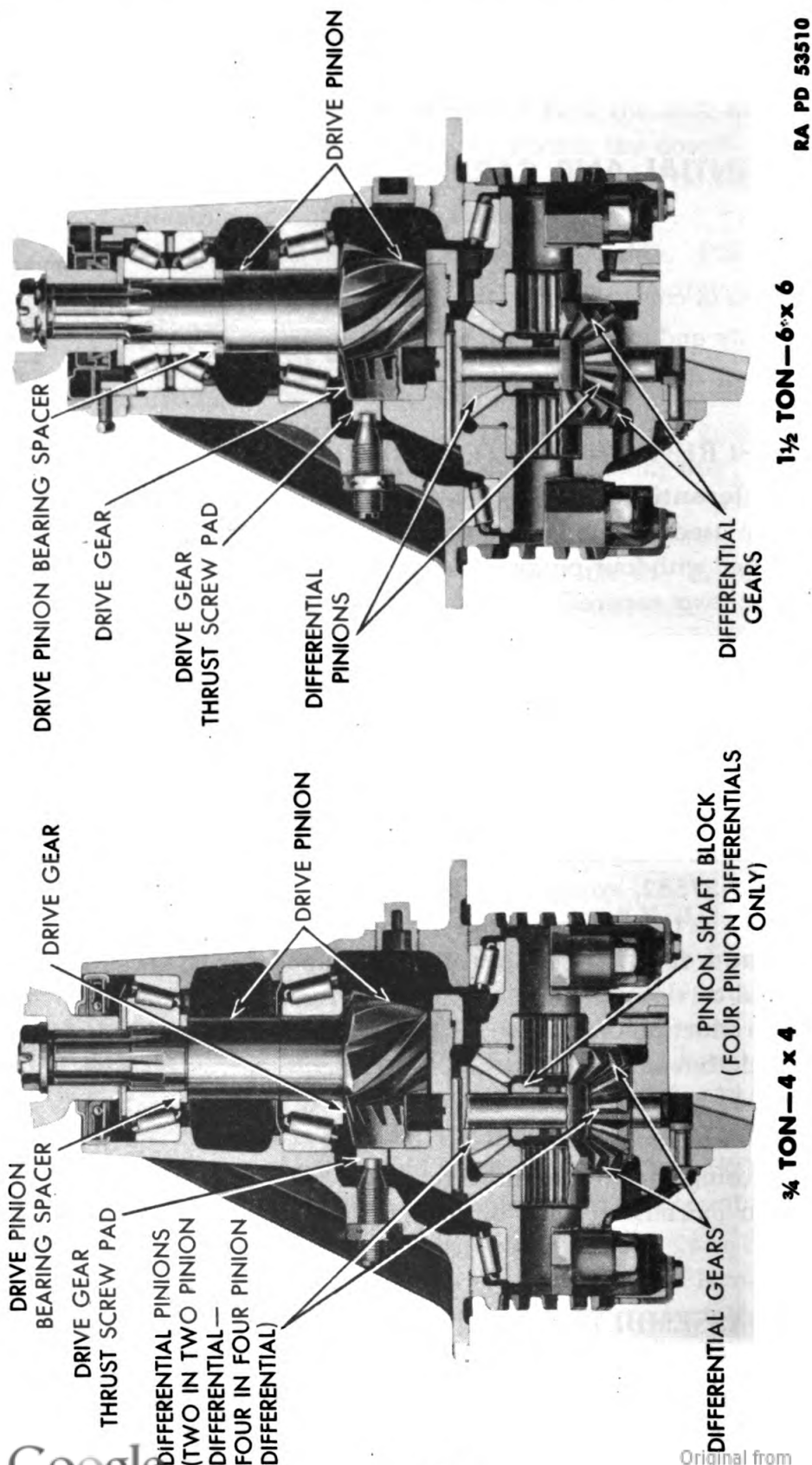
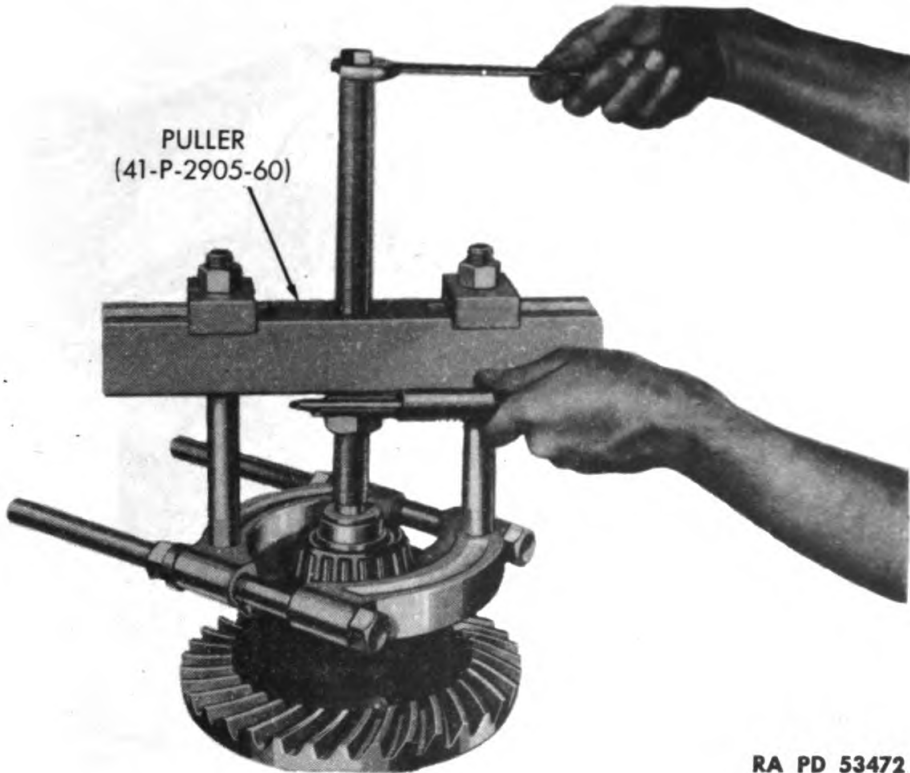


Figure 63—Differential and Carrier

DIFFERENTIAL AND CARRIER ASSEMBLY (FRONT AND REAR AXLES)

move the nut and flange. Pull the oil seal with puller (fig. 45). Mark the differential carrier and caps so that they can be assembled in their original position. Remove the differential bearing adjuster lock and loosen the bearing cap screws. Unscrew the adjusters to relieve the load on the bearings, and remove the bearing cups. Lift the differential and drive gear out of the carrier. Break the weld on the drive gear thrust pad screw and remove thrust pad, screw and nut.



RA PD 53472

Figure 64—Removing Differential Bearing

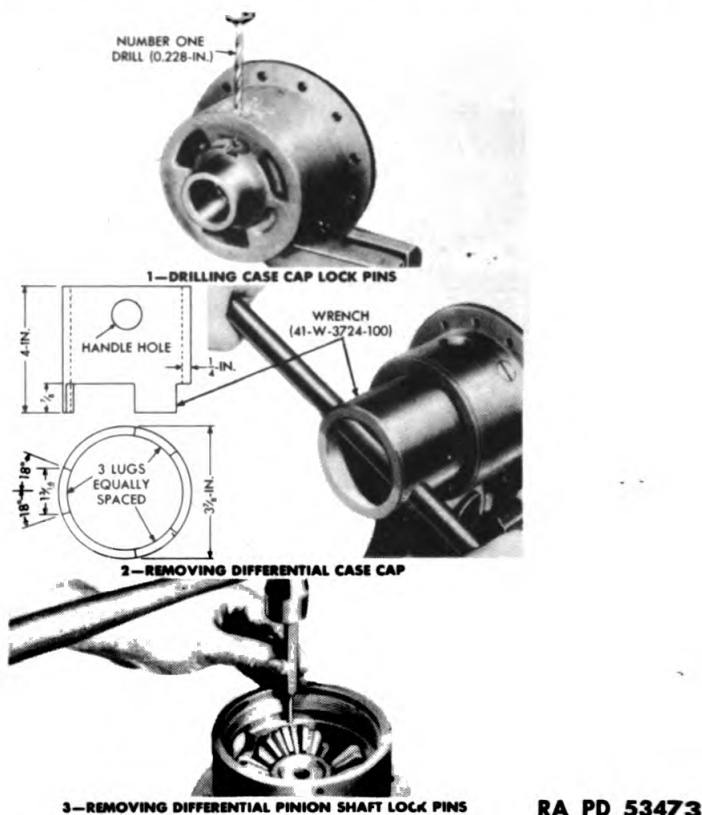
b. Remove Side Bearings and Drive Gear (fig. 64). Remove the differential bearings with puller. Remove the nuts and bolts that hold the drive gear to the differential case and push the press gear off the differential case.

c. Remove Differential Case Cap (fig. 65). Remove the differential case cap lock pins. To do this, drive the pin below the surface of the case. Then center-punch the pin accurately and drill it out with a number one (0.228-in.) drill (1, fig. 65). Remove the shell of the pin left in the hole, with a punch. Clamp the assembly by the drive gear flange between the copper jaws of a heavy vise. Heat the case immediately below the cap with an acetylene torch flame, moving the flame around the case until the metal will just cause ordinary solder to flow when the solder is rubbed over the heated surface of the case.

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)

When the case is thoroughly heated, loosen the cap with a blunt drift and heavy hammer, and unscrew the cap from the case with wrench (2, fig. 65).

d. **Remove Differential Pinions and Shafts** (fig. 65). Remove the differential pinion shaft lock pins by driving them out of the case with a hammer and punch (3, fig. 65)—one lock pin in two-pinion type differential and three lock pins in four-pinion type. With a drift



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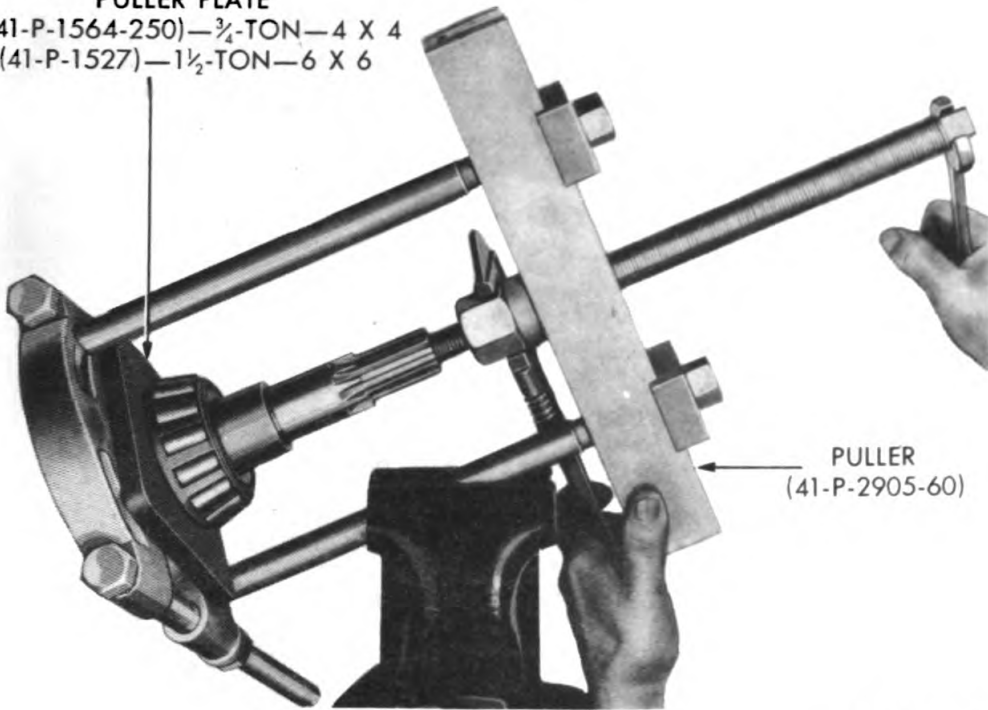
Figure 65—Disassembly of Differential Case

and hammer, drive out the long differential pinion shaft—one long shaft in two-pinion type differential; one long shaft with one lock pin and two short shafts in four-pinion type differential. At the same time, remove the gears and thrust washers as they become loose. In the four-pinion type differential, drive out both short shafts with a drift and hammer until the center block pinions and thrust washers are free from shafts, and remove the differential gear and thrust washer in the bottom of the differential case.

e. **Remove Drive Pinion and Bearings** (fig. 66) ($\frac{3}{4}$ Ton, 4 x 4 Truck). Slide the pinion out the differential end of the housing. Remove the oil slinger, washer and front bearing cone. Remove the bear-

DIFFERENTIAL AND CARRIER ASSEMBLY (FRONT AND REAR AXLES)

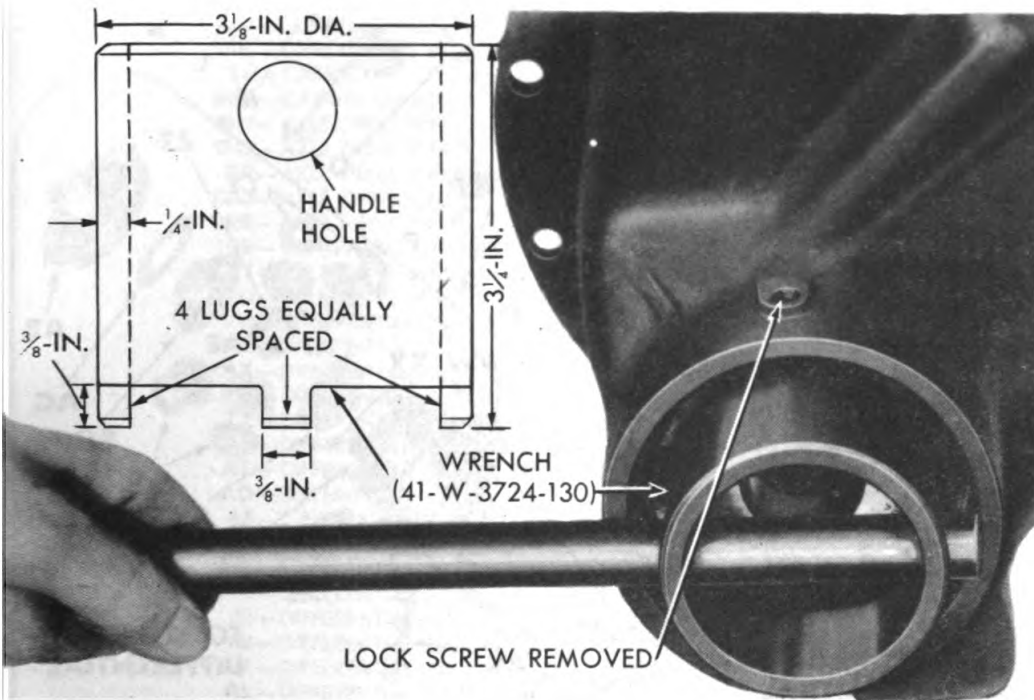
PULLER PLATE
(41-P-1564-250)— $\frac{3}{4}$ -TON—4 X 4
(41-P-1527)—1 $\frac{1}{2}$ -TON—6 X 6



PULLER
(41-P-2905-60)

RA PD 53474

Figure 66—Removing Drive Pinion Bearing

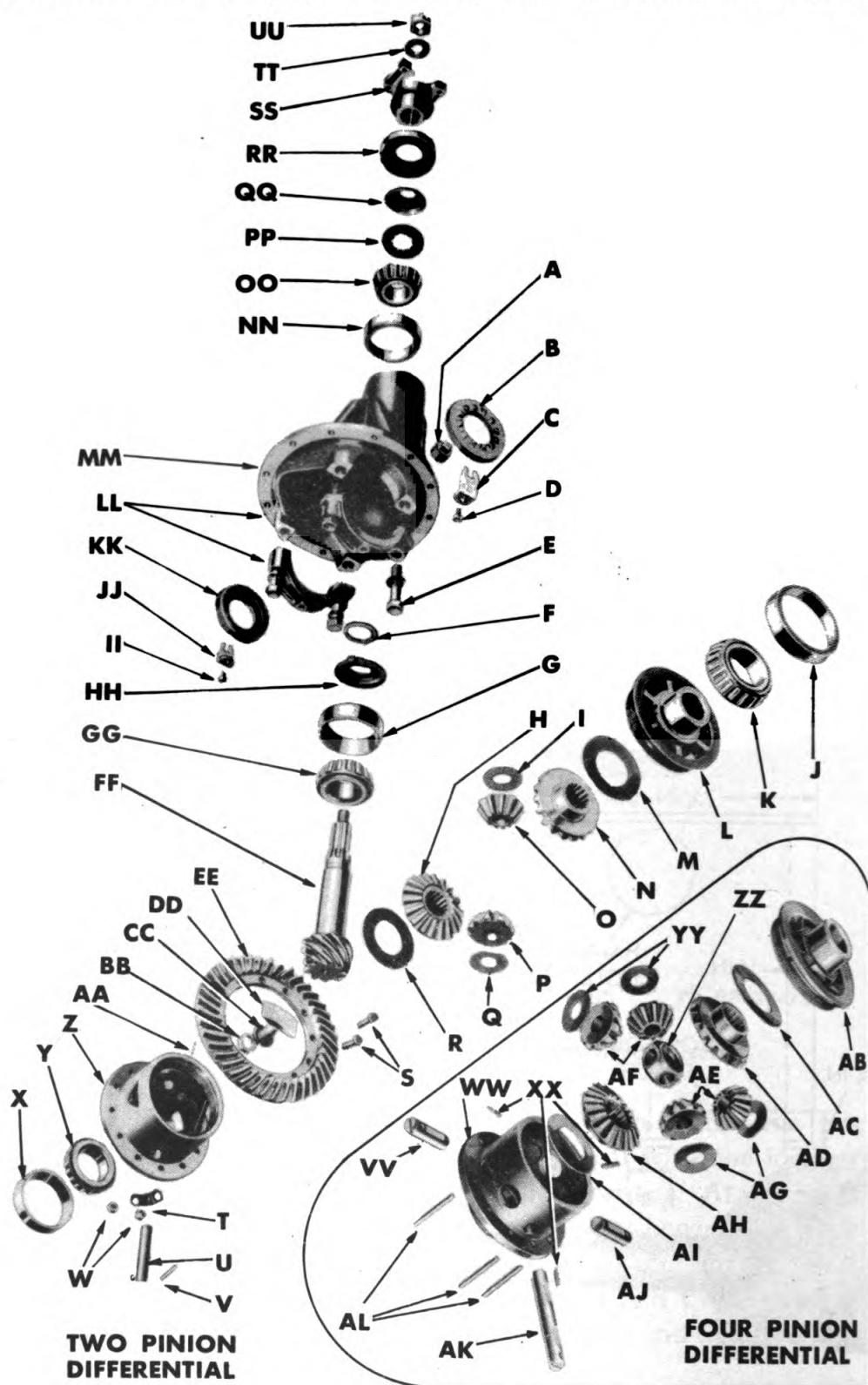


LOCK SCREW REMOVED

RA PD 53476

Figure 67—Removing Drive Pinion Bearing Retainer Nut

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1 $\frac{1}{2}$ TON 6 x 6 (DODGE)**



RA PD 53511

**Figure 68—Differential and Carrier Disassembled
($\frac{3}{4}$ Ton, 4 x 4 Truck)**

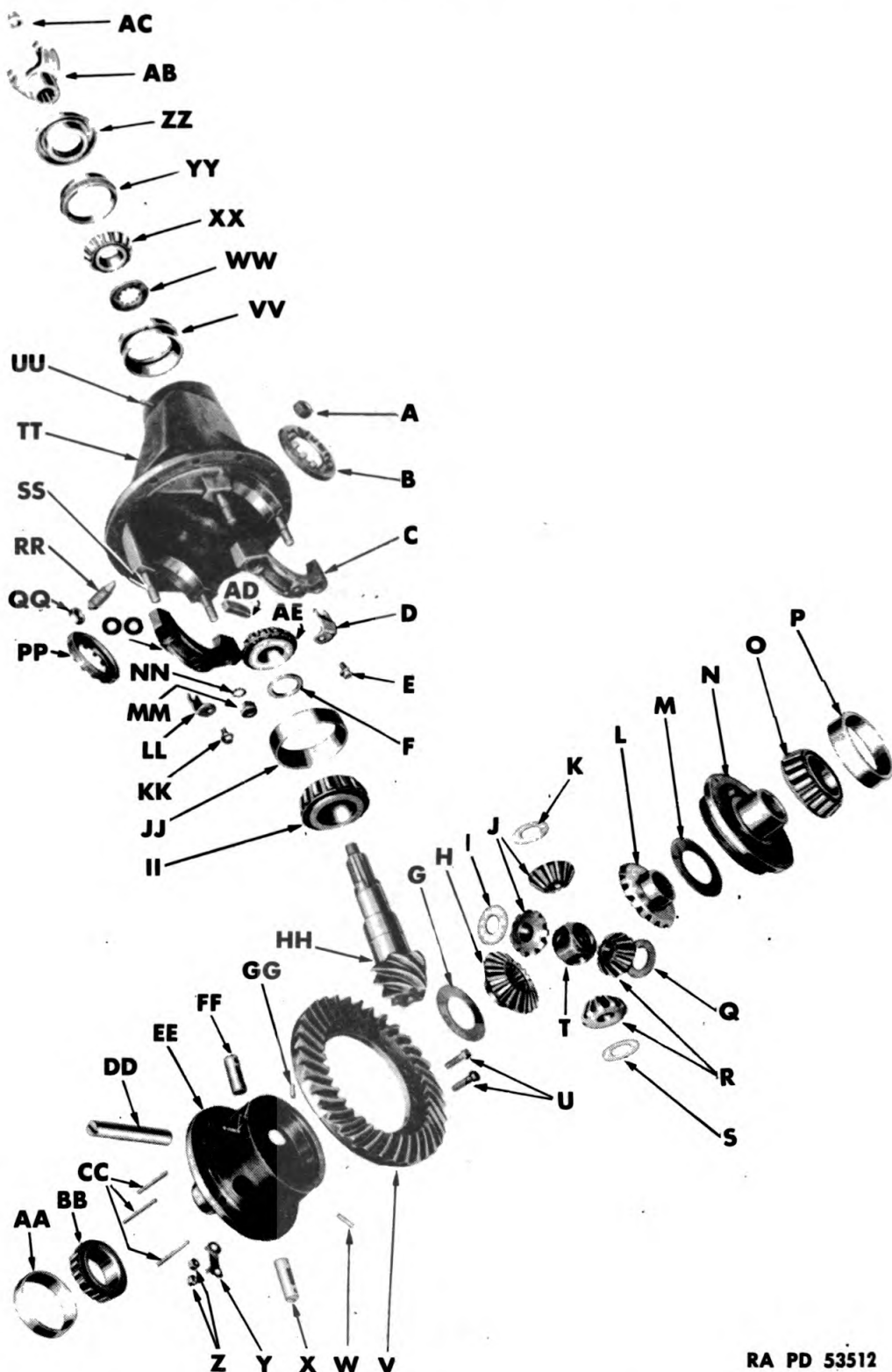
DIFFERENTIAL AND CARRIER ASSEMBLY (FRONT AND REAR AXLES)

A—FILLER PLUG
B—DIFFERENTIAL BEARING ADJUSTER
C—DIFFERENTIAL BEARING ADJUSTER LOCK
D—DIFFERENTIAL BEARING ADJUSTER LOCK SCREW
E—DIFFERENTIAL BEARING CAP SCREW AND LOCK WASHER
F—AXLE DRIVE PINION BEARING SPACER
G—AXLE DRIVE PINION BEARING CUP—INNER
H—DIFFERENTIAL GEAR
I—DIFFERENTIAL PINION THRUST WASHER
J—DIFFERENTIAL BEARING CUP
K—DIFFERENTIAL BEARING CONE
L—DIFFERENTIAL CASE CAP
M—DIFFERENTIAL GEAR THRUST WASHER
N—DIFFERENTIAL GEAR
O—DIFFERENTIAL PINION
P—DIFFERENTIAL PINION
Q—DIFFERENTIAL PINION THRUST WASHER
R—DIFFERENTIAL GEAR THRUST WASHER
S—AXLE DRIVE GEAR BOLTS
T—AXLE DRIVE GEAR BOLT NUT LOCK
U—DIFFERENTIAL PINION SHAFT
V—DIFFERENTIAL PINION SHAFT LOCK PIN
W—AXLE DRIVE GEAR BOLT NUTS
X—DIFFERENTIAL BEARING CUP
Y—DIFFERENTIAL BEARING CONE
Z—DIFFERENTIAL CASE
AA—DIFFERENTIAL CASE CAP LOCK PIN (3)
BB—AXLE DRIVE GEAR THRUST SCREW CHECK NUT
CC—AXLE DRIVE GEAR THRUST SCREW
DD—AXLE DRIVE GEAR THRUST SCREW PAD
EE—AXLE DRIVE GEAR
FF—AXLE DRIVE PINION
GG—AXLE DRIVE PINION BEARING CONE—INNER
HH—AXLE DRIVE PINION BEARING OIL BAFFLE
II—DIFFERENTIAL BEARING ADJUSTER LOCK SCREW
JJ—DIFFERENTIAL BEARING ADJUSTER LOCK
KK—DIFFERENTIAL BEARING ADJUSTER
LL—CARRIER WITH CAPS
MM—CARRIER GASKET
NN—AXLE DRIVE PINION BEARING CUP—OUTER
OO—AXLE DRIVE PINION BEARING CONE—OUTER
PP—AXLE DRIVE PINION BEARING WASHER
QQ—AXLE DRIVE PINION BEARING OIL SLINGER
RR—AXLE DRIVE PINION BEARING OIL SEAL
SS—COMPANION FLANGE
TT—AXLE DRIVE PINION FLANGE NUT WASHER
UU—AXLE DRIVE PINION FLANGE NUT
VV—DIFFERENTIAL PINION SHAFT—SHORT
WW—DIFFERENTIAL CASE
XX—DIFFERENTIAL CASE CAP LOCK PINS
YY—DIFFERENTIAL PINION THRUST WASHERS
ZZ—DIFFERENTIAL PINION SHAFT BLOCK
AB—DIFFERENTIAL CASE CAP
AC—DIFFERENTIAL GEAR THRUST WASHER
AD—DIFFERENTIAL GEAR
AE—DIFFERENTIAL PINIONS
AF—DIFFERENTIAL PINIONS
AG—DIFFERENTIAL PINION THRUST WASHERS
AH—DIFFERENTIAL GEAR
AI—DIFFERENTIAL GEAR THRUST WASHER
AJ—DIFFERENTIAL PINION SHAFT—SHORT
AK—DIFFERENTIAL PINION SHAFT—LONG
AL—DIFFERENTIAL PINION SHAFT LOCK PINS

RA PD 53511-B

Legend for Figure 68—Differential and Carrier Disassembled**($\frac{1}{2}$ Ton, 4 x 4 Truck)**

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)**



RA PD 53512

**Figure 69—Differential and Carrier Disassembled
(1½ Ton, 6 x 6 Truck)**

DIFFERENTIAL AND CARRIER ASSEMBLY (FRONT AND REAR AXLES)

- A**—FILLER PLUG
- B**—DIFFERENTIAL BEARING ADJUSTER
- C**—CARRIER CAP
- D**—DIFFERENTIAL BEARING ADJUSTER LOCK
- E**—DIFFERENTIAL BEARING ADJUSTER LOCK SCREW AND LOCK WASHER
- F**—AXLE DRIVE PINION BEARING SPACER
- G**—DIFFERENTIAL GEAR THRUST WASHER
- H**—DIFFERENTIAL GEAR
- I**—DIFFERENTIAL PINION THRUST WASHER
- J**—DIFFERENTIAL PINIONS
- K**—DIFFERENTIAL PINION THRUST WASHER
- L**—DIFFERENTIAL GEAR
- M**—DIFFERENTIAL GEAR THRUST WASHER
- N**—DIFFERENTIAL CASE CAP
- O**—DIFFERENTIAL BEARING CONE
- P**—DIFFERENTIAL BEARING CUP
- Q**—DIFFERENTIAL PINION THRUST WASHER
- R**—DIFFERENTIAL PINIONS
- S**—DIFFERENTIAL PINION THRUST WASHER
- T**—DIFFERENTIAL PINION SHAFT BLOCK
- U**—AXLE DRIVE GEAR BOLTS
- V**—AXLE DRIVE GEAR
- W**—DIFFERENTIAL CASE CAP LOCK PIN
- X**—DIFFERENTIAL PINION SHAFT—SHORT
- Y**—AXLE DRIVE GEAR BOLT NUT LOCK
- Z**—AXLE DRIVE GEAR BOLT NUTS
- AA**—DIFFERENTIAL BEARING CUP
- BB**—DIFFERENTIAL BEARING CONE
- CC**—DIFFERENTIAL PINION SHAFT LOCK PINS
- DD**—DIFFERENTIAL PINION SHAFT—LONG
- EE**—DIFFERENTIAL CASE
- FF**—DIFFERENTIAL PINION SHAFT—SHORT
- GG**—DIFFERENTIAL CASE CAP LOCK PINS
- HH**—AXLE DRIVE PINION
- II**—AXLE DRIVE PINION BEARING CONE—INNER
- JJ**—AXLE DRIVE PINION BEARING CUP—INNER
- KK**—DIFFERENTIAL BEARING ADJUSTER LOCK SCREW AND LOCK WASHER
- LL**—DIFFERENTIAL BEARING ADJUSTER LOCK
- MM**—CARRIER CAP STUD NUT
- NN**—CARRIER CAP STUD NUT LOCK WASHER
- OO**—CARRIER CAP
- PP**—DIFFERENTIAL BEARING ADJUSTER
- QQ**—AXLE DRIVE GEAR THRUST SCREW CHECK NUT
- RR**—AXLE DRIVE GEAR THRUST SCREW
- SS**—CARRIER CAP STUD
- TT**—CARRIER
- UU**—AXLE DRIVE PINION BEARING RETAINER NUT LOCK SCREW
- VV**—AXLE DRIVE PINION BEARING CUP—OUTER
- WW**—AXLE DRIVE PINION BEARING WASHER
- XX**—AXLE DRIVE PINION BEARING CONE—OUTER
- YY**—AXLE DRIVE PINION BEARING RETAINER NUT
- ZZ**—AXLE DRIVE PINION BEARING OIL SEAL
- AB**—COMPANION FLANGE
- AC**—AXLE DRIVE PINION FLANGE NUT
- AD**—AXLE DRIVE GEAR THRUST SCREW PAD
- AE**—AXLE DRIVE PINION BEARING CONE—OUTER

RA PD 53512-B

Legend for Figure 69—Differential and Carrier Disassembled
(1½ Ton, 6 x 6 Truck)

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)

ing cups from the housing with drift and hammer and remove the rear bearing cone from the pinion with puller.

f. Remove Drive Pinion and Pinion Bearings (fig. 67) (1½ Ton, 6 x 6 Truck). Push the pinion out the rear of the housing. Remove the splined washer from the front of the housing. Loosen set screw in housing and screw out the large bearing retaining nut with wrench. Remove the front bearing front cone and drift the bearing cups from the housing. Remove the front bearing rear cone and bearing spacer from shaft and pull off the rear bearing cone (fig. 66).

g. Inspect Parts (figs. 68 and 69). Clean all parts thoroughly in dry-cleaning solvent. Inspect the drive gear and pinion for chipped, scored or broken teeth. Inspect the surface of the pinion, where the oil seal contacts, for being rough or scored. If either the drive gear or pinion is damaged, replace both with a pair of matched gears. Inspect all bearings and bearing cups for excessive wear, cracks or roughness. Inspect differential gears and pinions for scored or damaged teeth. Check pinion shafts and holes in pinions for excessive wear. Inspect differential gear and pinion thrust washers. If wear is evident, replace the washers. Inspect the drive gear thrust pad and the back of the drive gear. If the contact surfaces are scored or rough, smooth up the surfaces or replace the damaged parts.

60. ASSEMBLY OF DIFFERENTIAL CARRIER.

a. Install Differential Gears, Pinions and Shafts (Two-pinion Type) (figs. 68 and 69). If new differential gears are to be installed, place a new composition thrust washer over the hub of the differential gear and lay the gear in the case. Hold the lock hole in the pinion shaft in line with the hole in the case, install thrust washers and pinions and drive the shaft into place. Install new lock pin and peen over outside edge of hole.

b. Install Differential Gears, Pinions and Shafts (Four-pinion Type) (figs. 68 and 69). If new differential side gears are to be installed, place a new composition thrust washer over the hub of the differential gear and lay the gear in the differential case. Line up locking pin hole in lone pinion shaft with hole in differential case pinion boss (opposite boss having no locking pin hole) and drive it in until it protrudes about $\frac{1}{16}$ inch on inside of case. Place the thrust washer so that the side with indents faces the pinion and install pinion. Insert pinion shaft block with punch-marked sides facing short shaft holes.

DIFFERENTIAL AND CARRIER ASSEMBLY (FRONT AND REAR AXLES)

and continue driving the long shaft through the block. Install the other pinion and thrust washers and drive the shaft into final position. Install a new locking pin and peen over. Drive one of the short pinion shafts into either of the remaining holes until shaft protrudes about $\frac{1}{16}$ inch on inside of the case. Be sure lock pin holes line up. Then install thrust washer and gear and continue driving short shaft until the shaft enters the hole in pinion shaft block. Insert the locking pin and peen it over. Install the other short shaft thrust washer, gear and lock pin in the same manner.

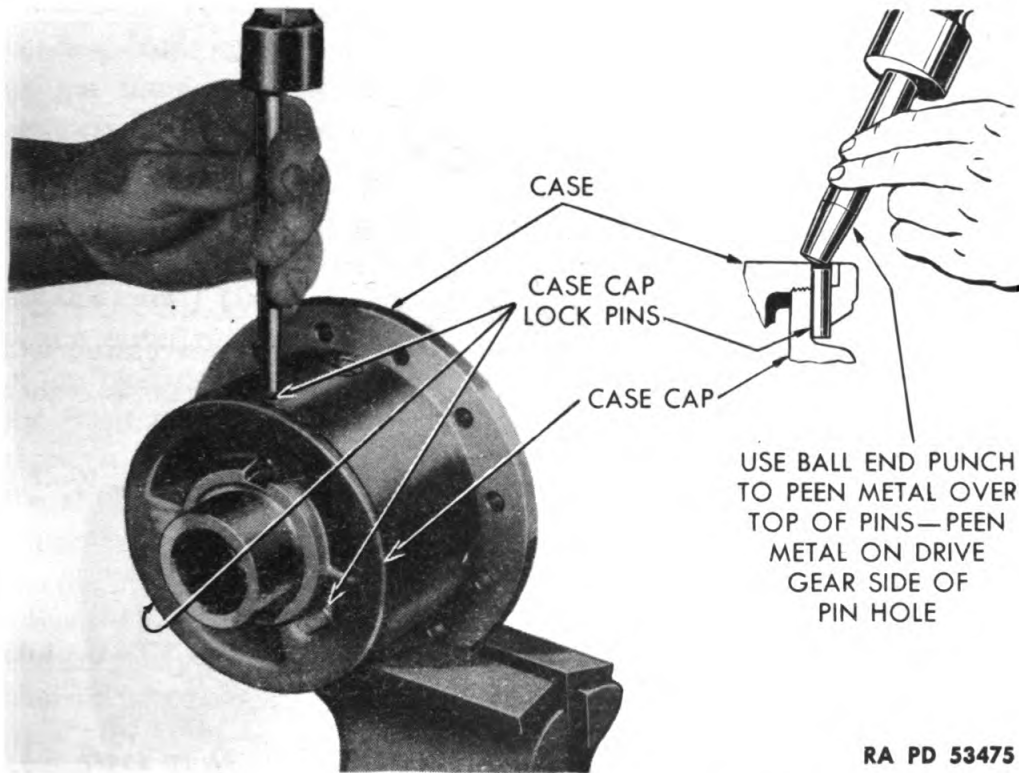


Figure 70—Staking Differential Case Cap Lock Pins

c. **Install Differential Case Cap (fig. 70).** Clamp the assembly by the drive gear flange between the copper jaws of a heavy vise and heat the threaded portion of the case on the outside surface with an acetylene torch flame in the same manner as outlined in paragraph 59 c. Dip the threaded portion of the cap in gear oil, assemble the thrust washer and differential gear in the cap, and screw the cap into the differential case. Then tighten securely in position with a blunt punch and heavy hammer. Drill three holes evenly spaced through the differential case, near the cap flange and into the closed or heavy sections of the cap with a C (0.242-in.) drill. Drive in three new differential case cap lock pins $\frac{1}{16}$ inch below the surface of the case, and peen

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)

the metal of the case over the pins with a ball end punch, as shown in figure 70. Blow through the assembly with compressed air to remove all drill cuttings.

d. **Install Differential Bearings and Drive Gear.** Press the bearings on the differential case and install the drive gear on the case but do not tighten bolts until the differential is installed in the carrier.

e. **Install Drive Pinion and Bearings ($\frac{3}{4}$ Ton, 4 x 4 Truck)** (fig. 68). Install the pinion rear bearing oil baffle (HH, fig. 68) in

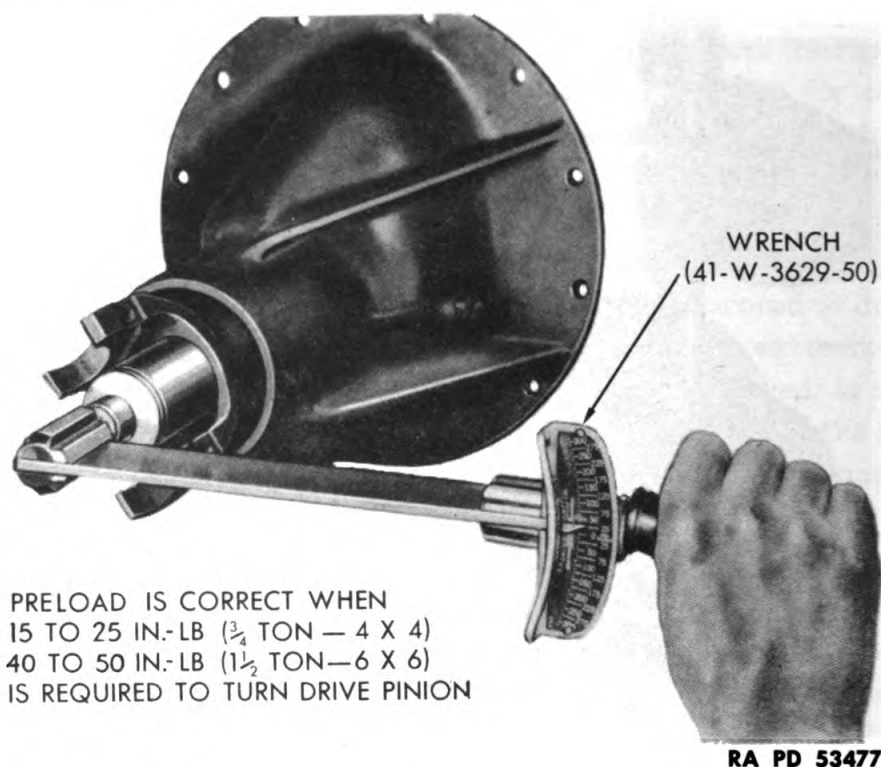


Figure 71—Checking Drive Pinion Bearing Preload

the carrier with a tab engaged in the lower notch of the carrier. Be sure the bearing cup surfaces in the carrier are clean and press the bearing cups tightly against the shoulders in the carrier. Press the pinion rear bearing tight against the pinion and place the pinion in the carrier. Place the original bearing spacer over the drive pinion, then install the outer bearing, washer and oil slinger in the order shown in figure 68, but do not install the oil seal assembly. Install the companion flange and tighten the nut securely.

f. **Adjust Drive Pinion Bearings ($\frac{3}{4}$ Ton, 4 x 4 Truck)** (fig. 71). Adjustment can be made by replacing the bearing spacer (F, fig. 68) with a thinner or thicker spacer. Attach an inch-pound torque

DIFFERENTIAL AND CARRIER ASSEMBLY (FRONT AND REAR AXLES)

wrench on companion flange nut and turn the drive pinion, noting amount of torque required while it is being turned (fig. 71). Less preload than 15 inch-pounds indicates the spacer is too thick, and more than 25-inch pounds of preload indicates the spacer is too thin. Spacers are available in thicknesses of 0.179, 0.181, 0.183, 0.185, 0.187, 0.189, 0.191 and 0.193 inch.

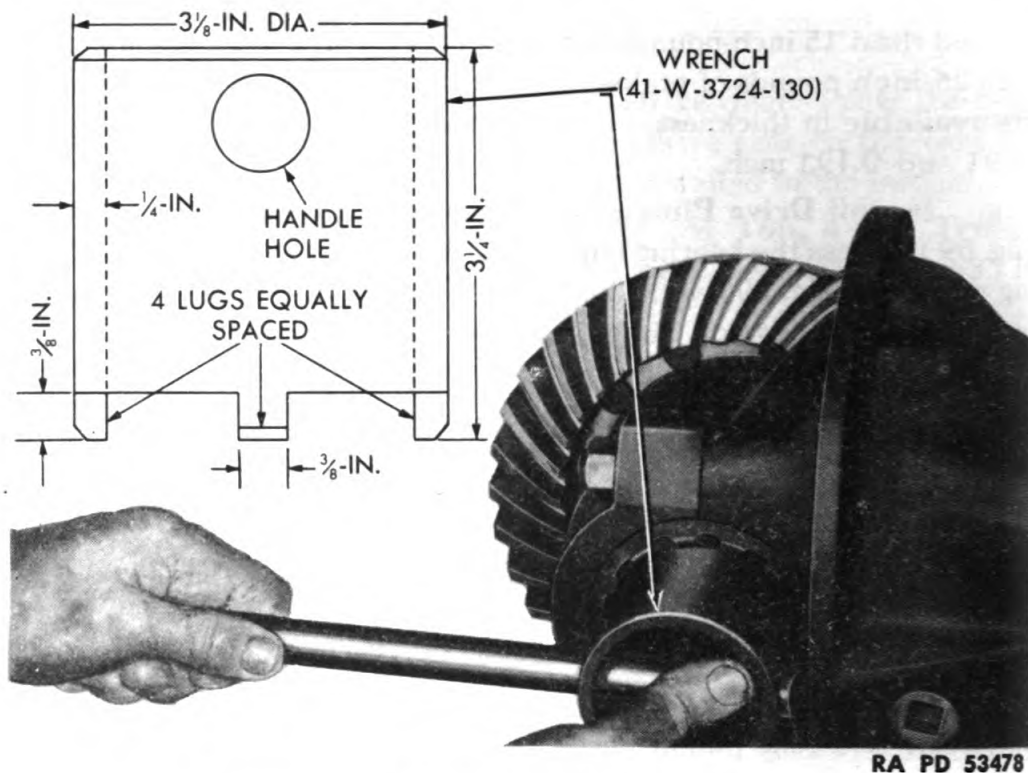
g. Install Drive Pinion and Bearing (1½ Ton, 6 x 6 Truck) (fig. 69). Press the bearing cups in the housing. Install the outer bearing cup (VV, fig. 69) with the letter Y etched in the edge of the cup, toward the companion flange. Oil the bearings and place the front bearing front cone in its cup with the letter Y also toward the companion flange. Screw the front bearing retainer nut (YY, fig. 69) securely into place with wrench (fig. 67) and tighten the set screw. Press the pinion outer bearing cone securely against the pinion. Install the outer bearing rear cone on the pinion shaft.

h. Assemble Drive Pinion for Adjusting Preload (1½ Ton, 6 x 6 Truck) (fig. 69). Install the bearing spacer (F, fig. 69) forward of the outer rear bearing instead of in its proper position at the rear of the bearing. This is necessary to permit adjusting preload between the front and rear pinion bearings. Insert the pinion in the housing through the outer bearing front cone. Place the splined washer over the shaft and install the companion flange. Tighten the companion flange nut as tight as possible when finally assembled. Do not install the oil seal until pinion bearings and differential bearings have been adjusted, and bearing spacer installed in its proper position. Shock the end of the shaft and revolve the shaft until the bearings roll smoothly.

i. Adjust Drive Pinion Bearings (1½ Ton, 6 x 6 Truck) (fig. 71). Adjustment can be made by replacing the bearing spacer (F, fig. 69) with a thinner or thicker spacer. Attach an inch-pound torque wrench on propeller shaft companion flange nut and turn the drive pinion, noting amount of torque required while it is being turned (fig. 71). Less preload than 40 inch-pounds indicates the spacer is too thick, and more than 50 inch-pounds of preload indicates the spacer is too thin. Spacers are available in thicknesses of 0.179, 0.181, 0.183, 0.185, 0.187, 0.189, 0.191 and 0.193 inch. After drive pinion bearings have been properly adjusted, remove the pinion from the housing and move the bearing spacer to the rear of the outer rear bearing. Install the pinion and companion flange without the oil seal. Tighten the flange attaching nut, then back it off ¼ turn and shock the shaft to relieve bearing preload while differential bearings are being adjusted.

j. Install Differential Assembly in Carrier (fig. 72). Install a steel (not bronze) thrust pad with a new screw and nut. Place the

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)



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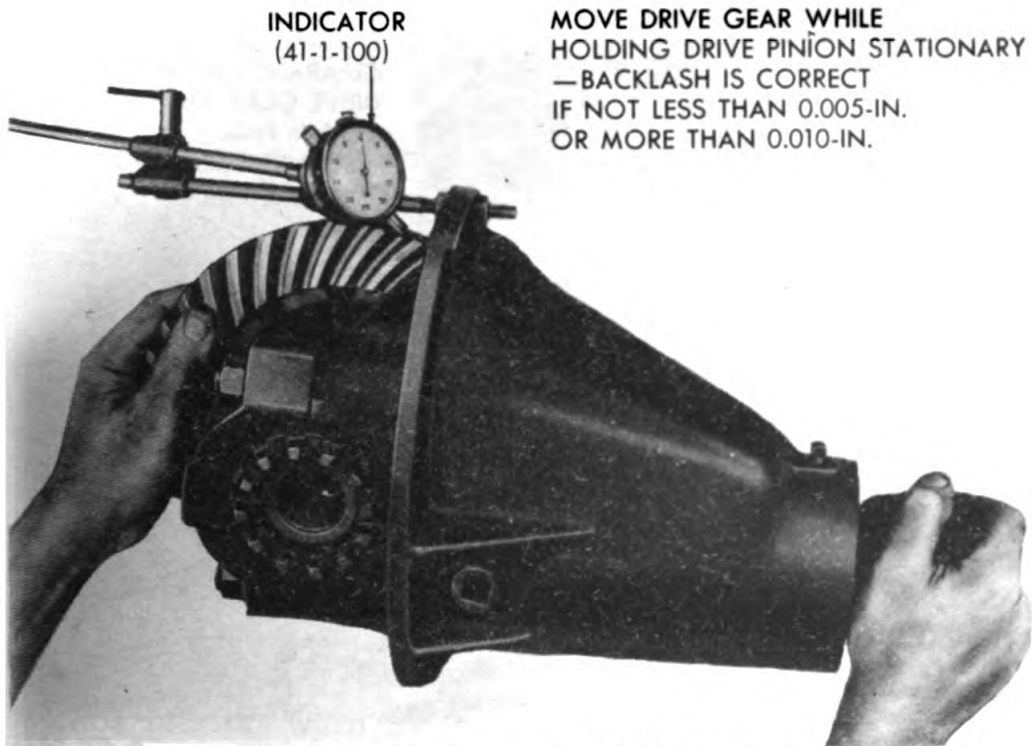
Figure 72—Installing Differential Bearing

bearing caps over the differential bearings and install the assembly in the carrier. Tighten cap screws or stud nuts sufficiently to hold the caps in place but not securely tight. Tighten the drive gear attaching bolts and close the locks around the nuts. Screw the differential bearing adjusters into place with wrench (fig. 72).

k. Set Bearing Adjusters. Set the bearing adjuster on the left-hand side to permit an approximate adjustment of clearance between the drive gear and the drive pinion. Tighten the right-hand bearing adjuster with sufficient force to seat the bearings in the cups and cause a slight drag in the bearings. Tap the bearing caps with a hammer while turning the adjusters to insure the proper seating of the rollers, cups and adjusters. Make sure the drive gear thrust screw pad does not contact the drive gear.

l. Adjust Clearance (Backlash) Between Drive Gear and Pinion (fig. 73). Check the clearance with a dial indicator (1, fig. 73). If the clearance is less than 0.005 inch or more than 0.010 inch, move the drive gear toward or away from the drive pinion by turning both side bearing adjusters an equal amount in the same direction. When the clearance has been adjusted, tighten the bearing cap screws or stud nuts securely.

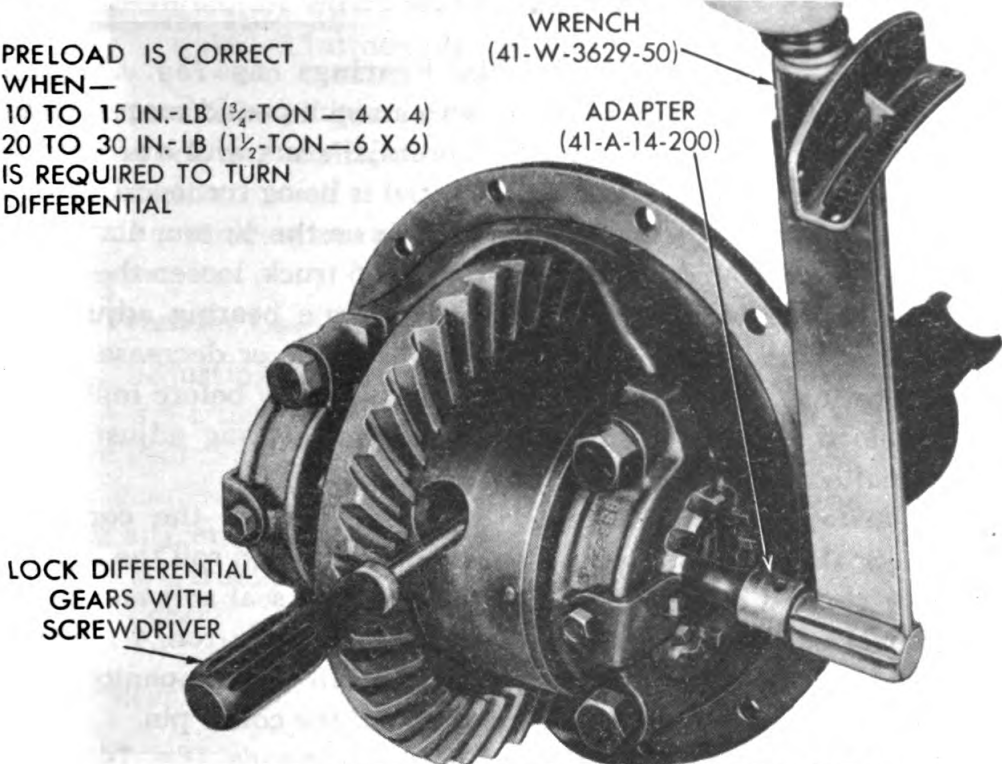
DIFFERENTIAL AND CARRIER ASSEMBLY (FRONT AND REAR AXLES)



1—CHECKING BACKLASH BETWEEN DRIVE GEAR AND PINION

PRELOAD IS CORRECT
WHEN—

10 TO 15 IN.-LB ($\frac{3}{4}$ -TON — 4 X 4)
20 TO 30 IN.-LB ($1\frac{1}{2}$ -TON — 6 X 6)
IS REQUIRED TO TURN
DIFFERENTIAL

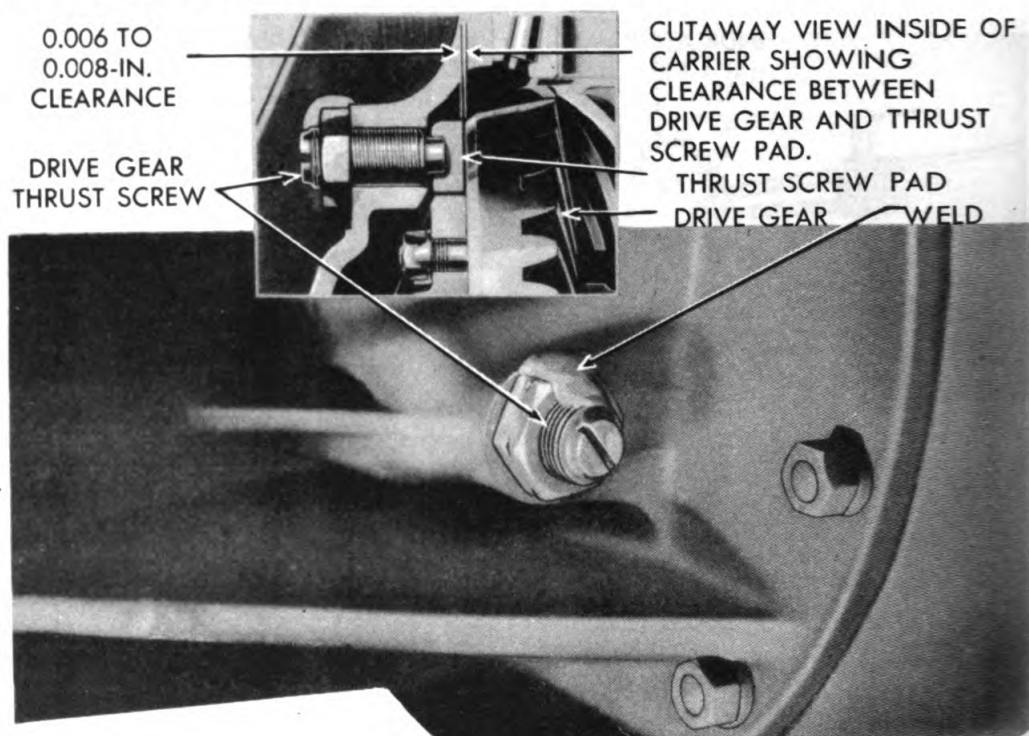


2—CHECKING PRELOAD OF DIFFERENTIAL BEARINGS

RA PD 53479

Figure 73—Adjusting Differential Bearing

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)



RA PD 53481

Figure 74—Drive Gear Thrust Screw Adjustment

m. Test Preload of Differential Bearings (fig. 73). Check the preload on the differential bearings with an inch-pound torque wrench and adapter (2, fig. 73). Lock the differential gears with a screwdriver and read the preload while the differential is being turned. If the preload is not between 10 and 15 inch-pounds on the $\frac{3}{4}$ ton, 4 x 4 truck, or 20 to 30 inch-pounds on the 1½ ton, 6 x 6 truck, loosen the bearing cap screws or stud nuts slightly and turn the bearing adjusters in opposite directions the same amount to increase or decrease preload on the bearings. Tighten the bearing caps securely before making the final preload and backlash tests. Install the bearing adjuster locks when final adjustment has been made.

n. Install Pinion Bearing Oil Seal. Remove the companion flange. Soak a new oil seal in light engine oil. Then roll the seal with pressure applied by a smooth bar to make the seal soft and pliable. Install seal in place with drift (41-R-2395-40 for $\frac{3}{4}$ ton, 4 x 4 truck; 41-D-1535-50 for 1½ ton, 6 x 6 truck), install the companion flange, tighten the attaching nut securely and install the cotter pin.

o. Adjust Drive Gear Thrust Pad Clearance (fig. 74). Turn the thrust pad screw in until the pad drags on the drive gear and back off $\frac{1}{8}$ of a turn to create 0.006 to 0.008-inch clearance. Tighten the lock nut securely and weld in place.

CHAPTER 2

POWER TRAIN (Cont'd)

Section X

FITS AND TOLERANCES—POWER TRAIN

Fits and tolerances.....	Paragraph 61
--------------------------	-----------------

61. FITS AND TOLERANCES.

a. Transmission.	Standard	Allowable Maximum
Countershaft diameter.....	0.9995 to 1.0000-in.	
Countershaft diameter wear.....		0.002-in.
Reverse idler shaft diameter.....	0.987-in.	
Reverse idler shaft wear.....		0.002-in.
Clearance in reverse idler gear bushing		0.006-in.
Shift rail poppet ball spring free length	$15\frac{1}{16}$ -in.	
Pounds pressure when compressed to $21\frac{1}{32}$ -in.....	22 to 26 lb	
b. Power Take-off.		
Backlash between transmission gear and power take-off gear.....	.003 to .008-in.	
Shift rail lock ball spring—		
Free length.....	$15\frac{1}{16}$ -in.	
Pounds pressure when compressed to $21\frac{1}{32}$ -in.....	20 to 26 lb	
c. Transfer Case.		
Bearing adjusting shim thickness ($\frac{3}{4}$ ton, 4 x 4 truck)—		
Drive gear.....	0.005, 0.010 and 0.012-in.	
Idler gear.....	0.005, 0.010 and 0.012-in.	
Bearing adjusting shim thickness ($1\frac{1}{2}$ ton, 6 x 6 truck)—		
Driven gear.....	0.004, 0.005, 0.0125 and 0.015-in.	
Idler gear.....	0.004, 0.005, 0.0125 and 0.015-in.	
d. Propeller Shafts and Universal Joints.		
Clearance between yoke splines and shaft splines.....	0.001 to 0.003-in.	

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)****e. Front Axle.**

	Standard	Maximum Allowable
Pivot pin angle.....	8 degrees	
Camber.....	1¼ to 1¾ degrees	
Caster (with driver and normal load).....	1 to 2 degrees	
Caster (no load).....	0 to 1 degree	
Toe-in.....	0 to ⅛-in.	
Turning angle (inside turn).....	28 degrees (—0 to —1 degree)	
Universal drive assembly end play...	0.013-in.	0.059-in.
Universal drive ball diameter.....	1.156-in.	
Universal drive replacement ball sizes available.....	Oversize 1.159-in. 1.158-in. 1.157-in.	Undersize 1.155-in. 1.154-in. 1.153-in.
Universal drive assembly preload....	20 to 24 ft lb	
Steering knuckle flange bearing preload	25 to 27½ ft lb	

f. Differential Carrier (Front and Rear Axles).

Drive gear and pinion backlash.....	0.005-in.	0.010-in.
Ring gear to thrust pad clearance....	0.006 to 0.008-in.	
Preload of drive pinion bearings (oil seal removed).....	15 to 25-in. lb (¾ ton, 4 x 4 truck) 40 to 50-in. lb (1½ ton, 6 x 6 truck)	
Preload of differential bearings.....	10 to 15-in. lb (¾ ton, 4 x 4 truck) 20 to 30-in. lb (1½ ton, 6 x 6 truck)	

CHAPTER 3

CHASSIS

Section I

GENERAL DESCRIPTION

	Paragraph
General description	62
Data and specifications	63

62. GENERAL DESCRIPTION.

a. **Foot Brakes** (figs. 75 and 76). The foot brakes are of the hydraulic expanding type and operate on all wheels. The foot brakes are operated by hydraulic pressure. The system consists of a master cylinder and wheel cylinders connected by high pressure tubes. The entire system is filled with a special hydraulic brake fluid and is free of air. When the brake pedal is depressed, a piston in the master cylinder displaces fluid from the master cylinder and creates equal pressure in all brake tubes. The fluid moves under pressure to the wheel cylinders where it enters between two pistons. The pistons move outward carrying the brake shoes into contact with the brake drums. When the brake pedal pressure is released, the return springs between the brake shoes displace the fluid from the wheel cylinders and the fluid returns to the master cylinder. Adjustments are provided to compensate for wear of the linings and drums. However, because the hydraulic pressure is always equal to all wheels, no adjustment is provided or required to equalize the brake shoe pressure.

b. **Hand Brake** (figs. 77 and 78). The hand brake consists of a drum and contracting band. It operates entirely independently of the foot brakes. The braking force of the hand brake is applied to the driving wheels through the propeller shafts and axles and is equalized by the axle differentials.

c. **Frame** (figs. 77 and 78). The frame consists of pressed steel channel section side rails reinforced by heavy cross members and angle braces. Tow hooks are provided at the front of the frame.

d. **Steering Gear** (figs. 77 and 78). The steering gear is of the worm and sector type. Adjustments for proper mesh and elimination of end play can be made without removing the assembly from the truck.

e. **Springs** (figs. 77 and 78). The chassis springs are of the semi-

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
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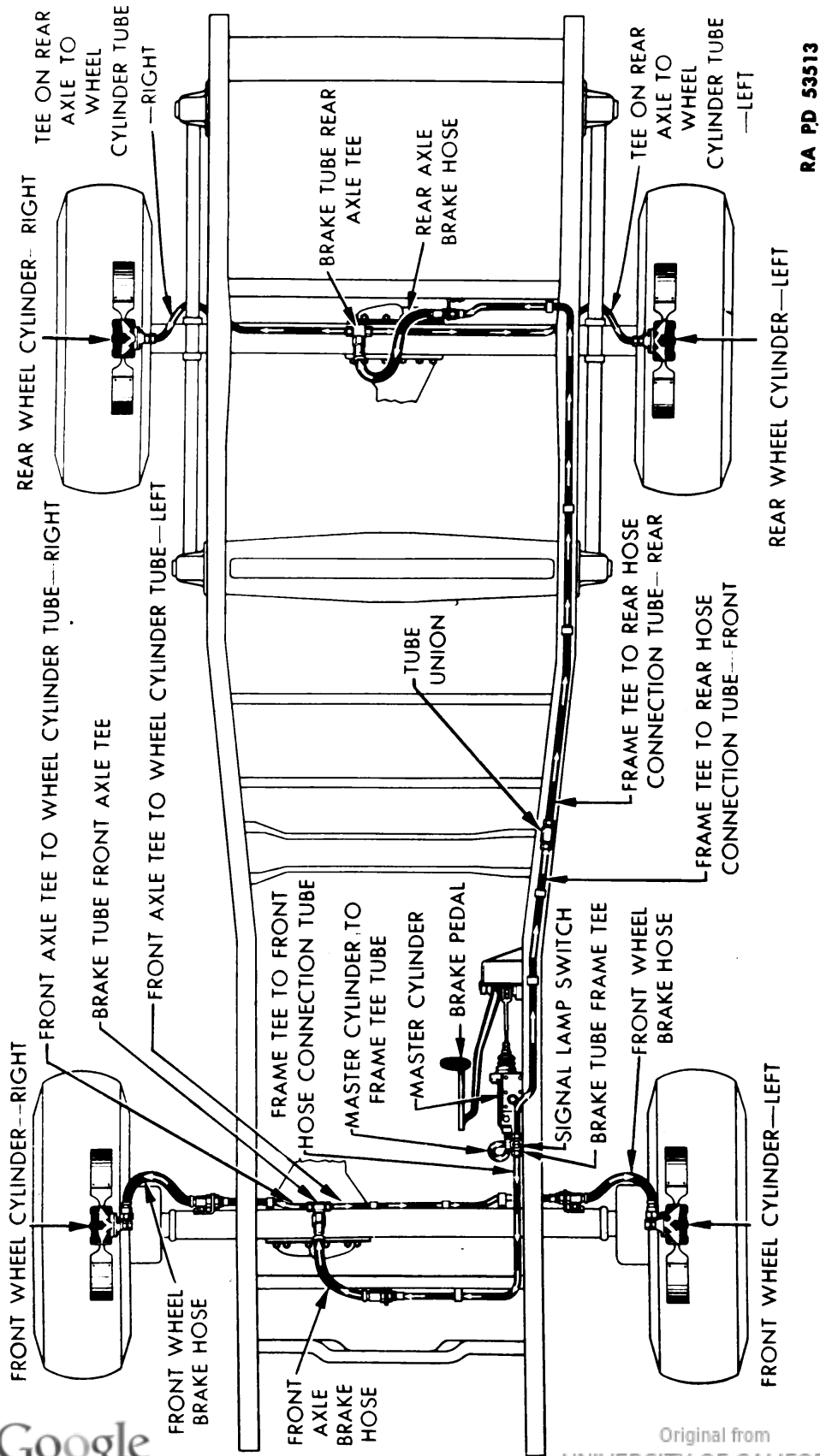
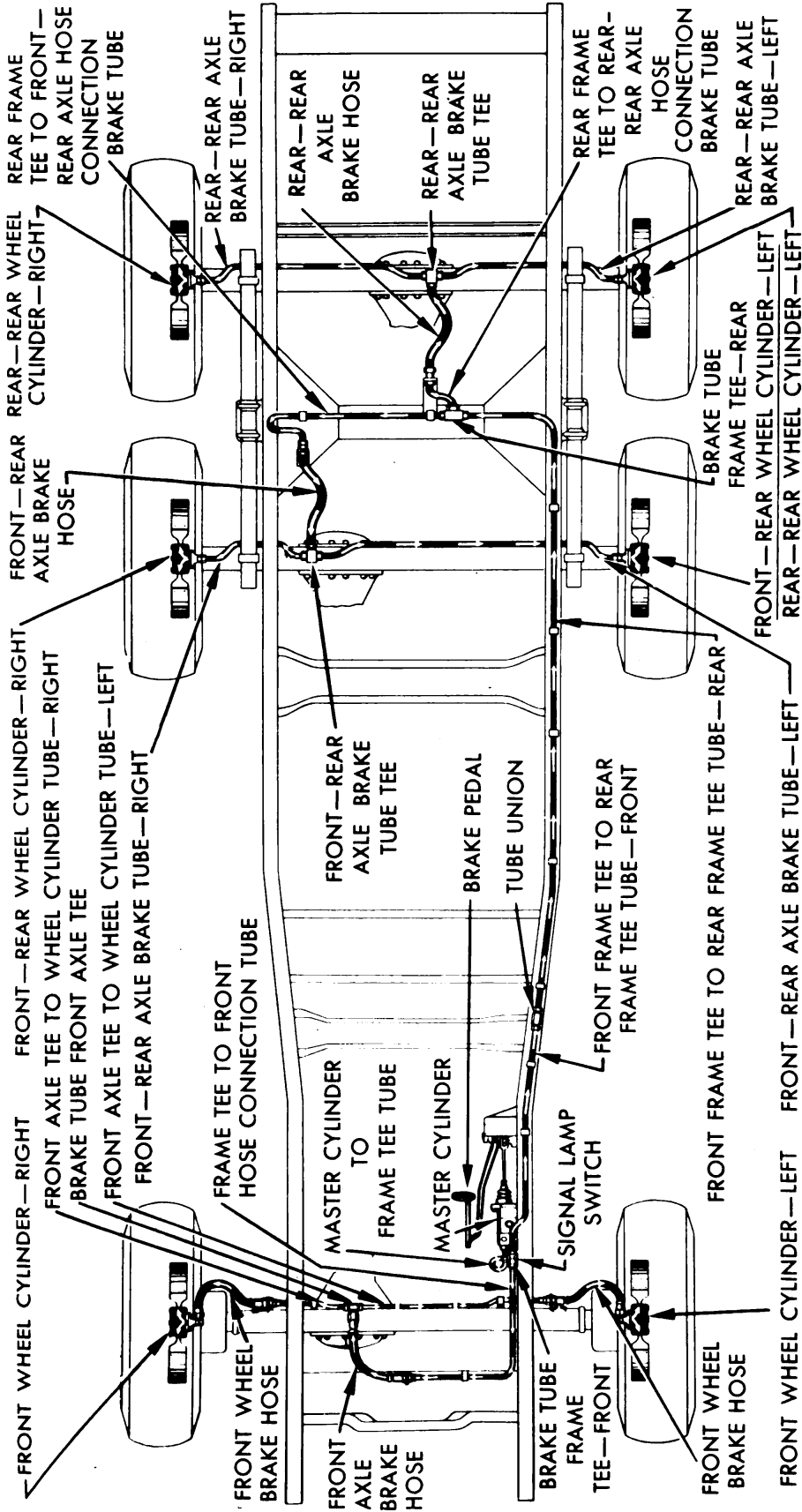


Figure 75—Hydraulic Brake System (¾ Ton, 4 x 4 Truck)

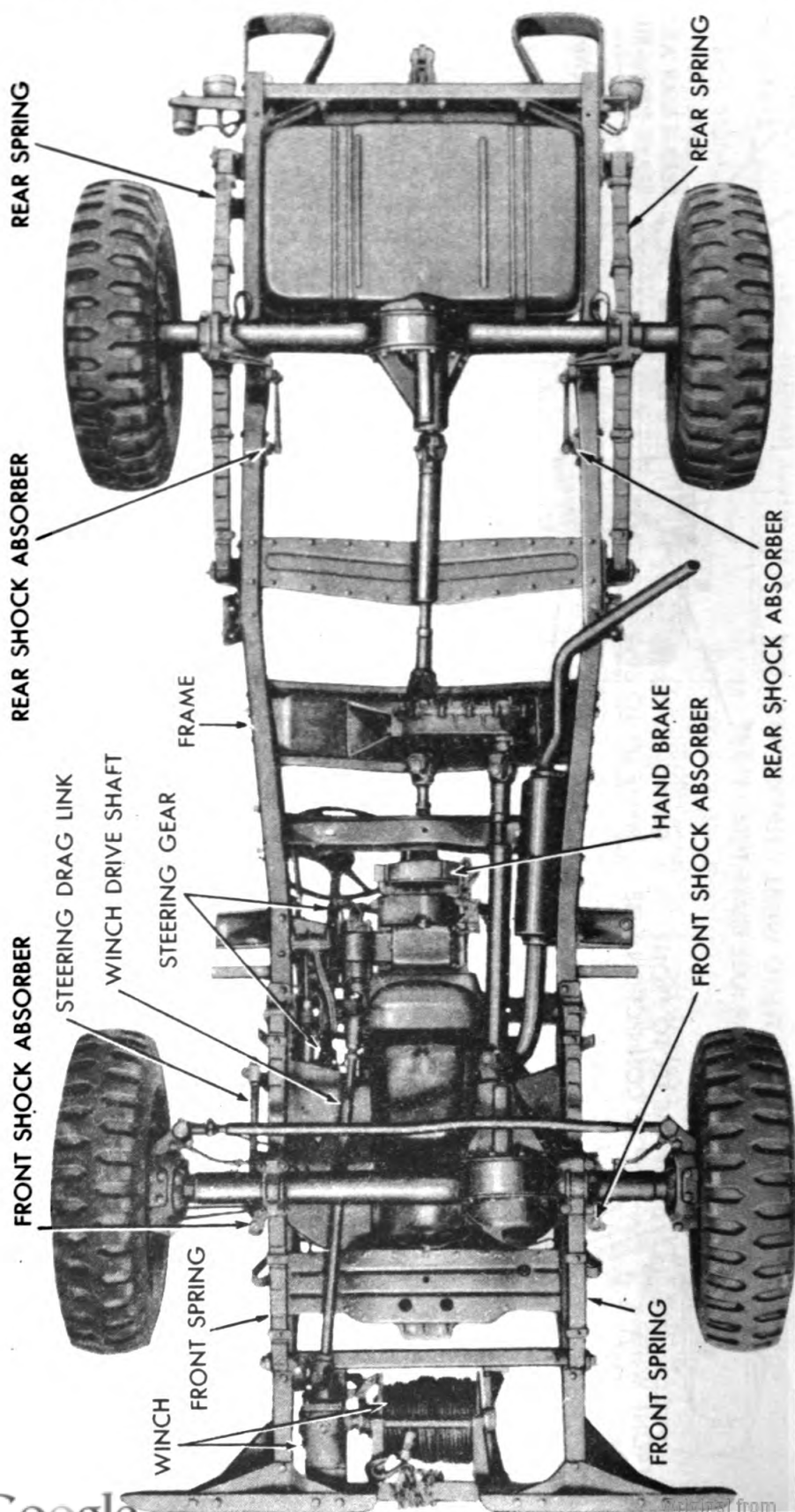
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RA PD 53514

Figure 76—Hydraulic Brake System (1½ Ton, 6 x 6 Truck)

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RA PD 53515

Figure 77—Chassis ($\frac{3}{4}$ Ton, 4 x 4 Truck)

GENERAL DESCRIPTION

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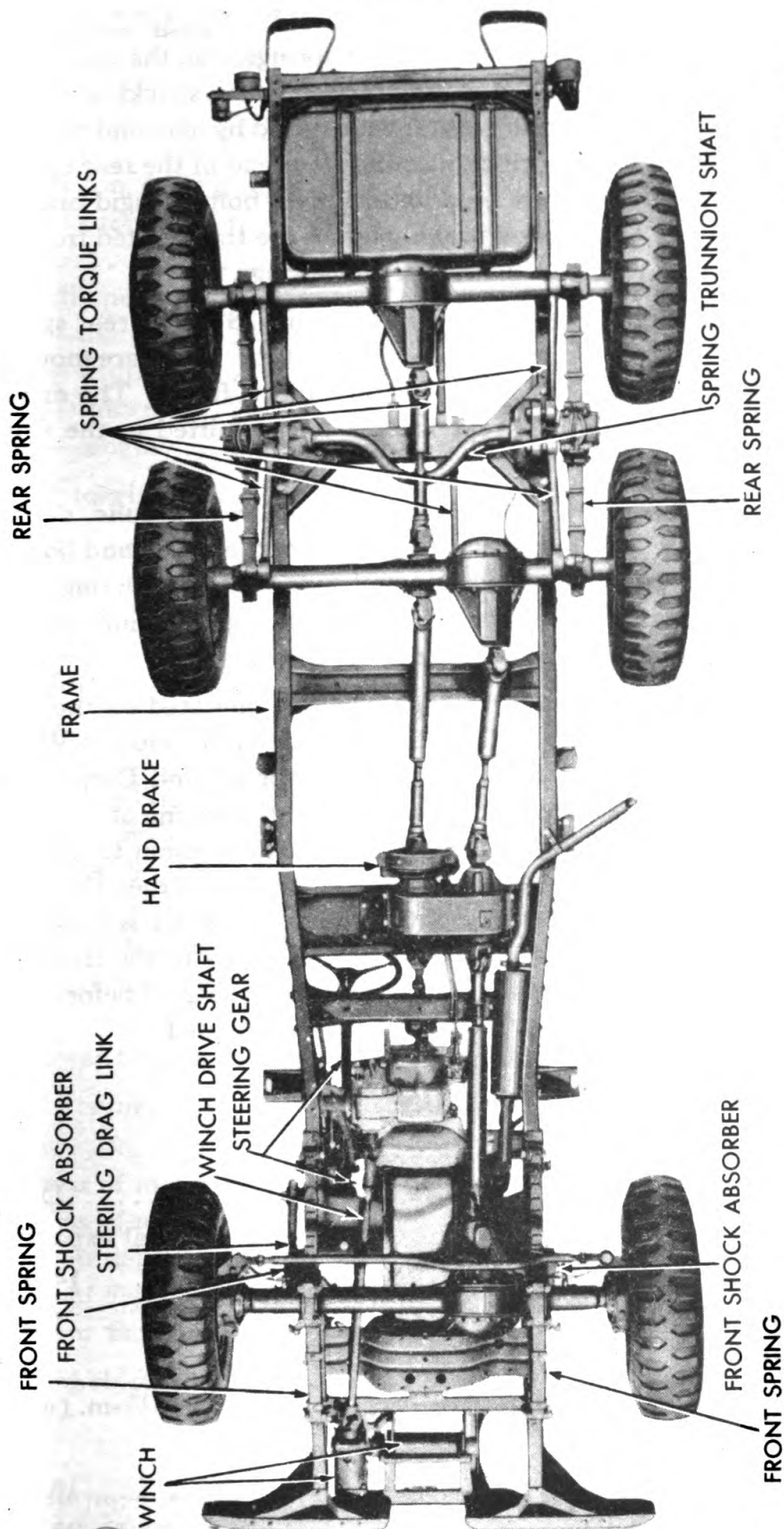


Figure 78—Chassis (1½ Ton, 6 x 6 Truck)

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
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elliptical type. The front end of the front springs, also the rear end of the rear springs, on the $\frac{3}{4}$ ton, 4 x 4 truck, pivot in shackles to allow for variant lengths of the springs as they are flexed by load and rebound. The rear end of the front springs, also the front end of the rear springs, on the $\frac{3}{4}$ ton, 4 x 4 truck, are mounted on pivot bolts in rigid brackets on the frame. The driving and braking forces are transmitted from the axles to the frame through this end of the springs.

f. **Rear Springs** (1½ ton, 6 x 6 truck) (fig. 78). The rear springs of the 1½ ton, 6 x 6 truck are of the cantilever type. They are mounted in the center on trunnion bearings attached to the frame. The driving and braking forces from the rear axles are transmitted to the frame through spring torque links.

g. **Shock Absorbers** (figs. 77 and 78). The hydraulic, double-acting shock absorbers control the movement of the frame and body of the truck in relation to the wheels and axles. By restricting rapid action of the chassis springs, the shock absorbers greatly improve the riding qualities and steering stability of the truck.

h. **Winch** (figs. 77 and 78). The winch is mounted on the front of the $\frac{3}{4}$ ton, 4 x 4 Weapon Carrier and Command (models WC-52 and WC-57) and on the 1½ ton, 6 x 6 Personnel and Cargo truck (model WC-63). It is operated by power from the engine of the truck. The power is transmitted through the truck transmission to a power take-off unit, mounted on the side of transmission case, then through a drive shaft to the winch assembly. Operation of the winch is controlled from the driver's compartment. A shear pin located in the front universal joint of the winch drive shaft is expected to shear off before damage occurs, should the winch be excessively overloaded.

63. DATA AND SPECIFICATIONS.

a. Foot Brakes.

Make	Dodge
Type	Hydraulic, internal expanding
Drum diameter	14 $\frac{1}{8}$ -in.
Lining—width	1 $\frac{3}{4}$ -in.
Lining—thickness	$\frac{1}{4}$ -in.
Lining—length (in two pieces)	14½-in. (each)
Fluid capacity of system:	
($\frac{3}{4}$ ton, 4 x 4 truck)	18½ oz
(1½ ton, 6 x 6 truck)	23½ oz

b. Hand Brake.

c. Steering Gear.

Lower bearing and cage only. .Bower—BT-15 or Timken—15A

e. Springs (3/4 Ton, 4 x 4 Truck).

front spring—width

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Front spring—number of leaves (all except Ambulance)

Up to Serial No. 81607816.....8

Serial Nos. 81607816 through 8161900.....9

Serial Nos. 81619001 to 81623728.....8

After Serial No. 81623728.....9

Ambulances10

Front spring—bolt diameter..... $\frac{5}{8}$ in.

Rear spring—length.....52 in.

Rear spring—width1¾ in.

Rear spring—number of leaves (all except ambulance).....12

Ambulance10

Bolt diameter.....¾ in.

f. Springs (1½ Ton, 6 x 6 Truck).

MakeDetroit Steel Products

Front spring—length.....39-in.

Front spring—width1¾-in.

Front spring—number of leaves.....11

Front spring—bolt diameter..... $\frac{5}{8}$ -in.

Rear spring—length42-in.

Rear spring—width.....2-in.

Rear spring—number of leaves.....12

Rear spring trunnion bearings (inner).....Cone—Timken 25,580

Cup—Timken 25,520

Rear spring trunnion bearings (outer).....Cone—Timken 25,576

Cup—Timken 25,520

g. Shock Absorbers.

MakeDelco

TypeHydraulic double acting

Model number:

$\frac{3}{4}$ ton, 4 x 4 truck $\frac{3}{4}$ ton, 4 x 4 truck 1½ ton, 6 x 6 truck
(except ambulance) (except ambulance)

FRONT

Left DP—5,383,002 DP—5,383,002 DP—5,383,002

Right DP—5,383,003 DP—5,383,003 DP—5,383,003

REAR

Left DP—5,383,053 DP—5,383,059 None

Right DP—5,383,052 DP—5,383,058 None

GENERAL DESCRIPTION

h. Winch.

Make Braden
Model MU-2
Capacity 5,000 lb
Worm thrust bearings:
 Make Timken
 Cup 23,256
 Cone and rollers 23,100
Lubricant capacity:
 Worm housing 1 qt
Winch drive shaft:
 Make Blood Brothers
 Model 4,080

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CHAPTER 3
CHASSIS (Cont'd)

Section II

TROUBLE SHOOTING

	Paragraph
Brakes.....	64
Steering gear	65
Springs and shock absorbers.....	66
Winch	67

64. BRAKES.

a. Brakes Fail Completely.

Possible Cause	Possible Remedy
Mechanical linkage between pedal and master cylinder piston disconnected or broken.	Connect or replace linkage.
Fluid line or hose broken.	Replace line or hose.
Piston cup in master or wheel cylinder damaged.	Rebuild master cylinder (pars. 74-77) or wheel cylinder (pars. 70-73).

b. Brakes Fail on First Pedal Operation but Function After Several Quick Operations.

Brake shoe to drum clearance excessive.	Adjust brake shoe cams (par. 69 h).
Fluid passing piston cup in master or wheel cylinder.	Rebuilding master cylinder (pars. 74-77) or wheel cylinder (pars. 70-73).
Fluid leaking from tube, connection or hose.	Replace necessary part.
Master cylinder valve leaks.	Rebuild master cylinder (pars. 74-77).

c. Hard Pedal and Poor Brakes.

Anchor bolts improperly adjusted.	Adjust anchor bolts (par. 69 h).
Brake lining worn or glazed.	Reline brake shoe assemblies (par. 69).
Brake drums badly scored.	Regrind brake drums (par. 69).

TROUBLE SHOOTING

d. Spongy Brake Pedal.

Possible Cause	Possible Remedy
Anchor bolts improperly adjusted.	Adjust anchor bolts (par. 69 h).
Insufficient fluid in brake system.	Replenish fluid in master cylinder supply tank and bleed air from system (par. 77 c).

e. Pedal Goes Slowly to Floor Under Application.

Fluid leaking from tube connection or hose.	Tighten or replace necessary part.
Fluid passing piston cup in master or wheel cylinder.	Rebuild master cylinder (pars. 74-77), or wheel cylinder (pars. 70-73).

f. Brakes Grab, Chatter or Uneven Application.

Grease or brake fluid on brake lining.	Reline brake shoes (par. 69).
Lining loose on brake shoe.	Reline brake shoe (par. 69).
Anchor bolts improperly adjusted or loose.	Adjust and tighten (par. 69 h).
Shoes not all equipped with same kind of lining.	Reline shoes with one make and type of lining (par. 69).
Wheel cylinder pistons sticking.	Rebuild wheel cylinder (pars. 70-73).
Spring clips (U-bolts) loose.	Tighten clips.

g. Brakes Drag.

Shoes adjusted too close to drum.	Adjust brake shoe cams (par. 69 h) and anchor bolts, if necessary.
Shoe return spring broken.	Replace spring.
Shoes sticking on anchor bolts.	Free shoes at bolts.
Wheel bearing loose.	Adjust wheel bearings (front—par. 49 i; rear—par. 56 d).
No brake pedal free travel resulting in master cylinder piston cup being held over relief port.	Adjust pedal free travel (par. 77 h).

65. STEERING GEAR.

a. Backlash in Steering.

Drag link ends improperly adjusted.	Adjust drag link ends.
Steering gear (Pitman) arm loose on steering gear.	Tighten steering gear arm nut.

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Possible Cause	Possible Remedy
End play in steering gear tube and worm.	Adjust end play (par. 82 b).
End play in steering gear shaft.	Adjust end play (par. 82 d).
Improper mesh of worm and sector.	Adjust worm and sector (par. 82 e).
Worn or damaged parts in steering gear.	Rebuild steering gear (pars. 80-83).

b. Hard Steering.

Tires under-inflated.	Inflate tires to 40-pounds pressure.
Lack of lubrication.	Lubricate steering gear, knuckles and linkage.
Steering gear adjusted too tightly.	Adjust steering gear (par. 83).
Excessive friction in steering post bracket.	Aline steering post (par. 83 h).

c. Shimmy. (An oscillating motion of the front wheels, making it difficult to hold the steering wheel steady.)

Under-inflated tires.	Inflate tires to 40-pounds pressure.
Steering knuckle flange bearings loose.	Adjust bearings (par. 49 c).
Wheel and tire assemblies out of balance.	Balance wheels.
Steering gear loose on frame.	Tighten attaching bolts.
Drag link or tie rod ends loose.	Adjust link ends or place tie rod ends.
Front spring leaves broken.	Repair springs (par. 87).

66. SPRINGS AND SHOCK ABSORBERS.

a. Spring Breakage.

Loose spring clips (U-bolts) causing springs to break between clips.	Keep clips tightened.
Excessive friction at spring bolt or shackles causing breakage at or near spring eye.	Free up and lubricate front spring bolts and shackles and adjust front shackles if too tight (par. 87 c).
Lack of spring control by shock absorbers.	Inspect and refill shock absorbers (par. 90).
Over-lubrication of spring leaves.	Lubricate bolts and shackles only.
Extremely rough handling of vehicle over rough terrain.	Reduce vehicle speed over rough terrain when possible.

TROUBLE SHOOTING

b. Noise in Springs or Shock Absorbers.

Possible Cause	Possible Remedy
Spring shackles worn or damaged.	Adjust shackles or replace if necessary.
Spring bolt worn.	Replace bolt.
Rear spring trunnion bearings loose or damaged (1½ ton, 6 x 6 truck).	Adjust or replace bearings (par. 89).
Shock absorber link bushing worn or damaged.	Replace link assembly.
No fluid in shock absorber.	Refill shock absorber (par. 90).

c. Lack of Spring Control.

No fluid in shock absorber.	Refill shock absorber (par. 90).
Shock absorber linkage broken.	Replace link assembly.
Shock absorber inoperative.	Replace shock absorber (par 90).
Chassis springs over-lubricated.	Do not lubricate spring leaves.
Spring bolts, bushings, or shackles worn.	Replace worn parts (par. 87-88).
Spring clips loose or broken.	Tighten or replace clips.
Spring center bolt broken.	Replace spring bolt (par. 87).
Shock absorbers not functioning.	Service shock absorbers (par. 90).
Axle housing or frame damaged.	Repair damage.

d. Steering Wander. (A tendency of the vehicle to steer itself off a straight line.)

Excessive friction in steering mechanism.	Locate and eliminate excessive friction.
Wheel bearings loose.	Adjust wheel bearings (par. 49 i).
Toe-in incorrect.	Adjust toe-in (par. 42 d).
Steering knuckle flange bearings adjusted too tightly.	Adjust bearings (par. 49 c).

e. Steering Dive. (A tendency of the vehicle, when turned in any direction, to turn more rapidly than intended.)

Steering gear loose on frame.	Tighten attaching bolts.
Front spring leaves broken.	Replace spring leaves (par. 87).
Spring bolts, bushings or shackles badly worn.	Replace worn parts (par. 87).
Spring clips loose or broken.	Tighten or replace clips.
Spring center bolt broken.	Replace spring bolt (par. 87).
Axle housing or frame damaged.	Repair damage.

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67. WINCH.

a. Winch Fails to Operate.

Possible Cause	Possible Remedy
Power take-off not engaged.	Engage power take-off.
Sliding clutch disengaged from winch drum.	Move clutch shifter lever to forward position and engage pin in hole.
Shear pin in winch drive shaft front universal sheared.	Replace shear pin.

b. Noisy Operation of Winch.

Insufficient lubrication of cable drum shaft.	Lubricate through fittings.
Lubricant low in worm housing.	Fill housing to level of plug on side of housing.
Insufficient clearance between power take-off and transmission gears causing noise.	Install sufficient gaskets to correct clearance (par. 16 k).
Excessive end play in winch worm shaft.	Adjust bearings (par. 94 c).

c. Winch Will Not Hold Load.

Safety brake not properly adjusted.	Adjust safety brake (par. 96 a).
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d. Winch Drum Spins when Cable is being Released.

Winch drum brake not properly adjusted.	Adjust drum brake (par. 96 b).
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CHAPTER 3

CHASSIS (Cont'd)

Section III

BRAKES

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Brake drum and lining repairs	69
Removal of wheel cylinder	70
Disassembly and inspection of wheel cylinder	71
Assembly of wheel cylinder	72
Installation of wheel cylinder	73
Removal of master cylinder	74
Disassembly and inspection of master cylinder	75
Assembly of master cylinder	76
Installation of master cylinder	77
Removal, repair and installation of hand brake	78

68. DESCRIPTION OF CONSTRUCTION.

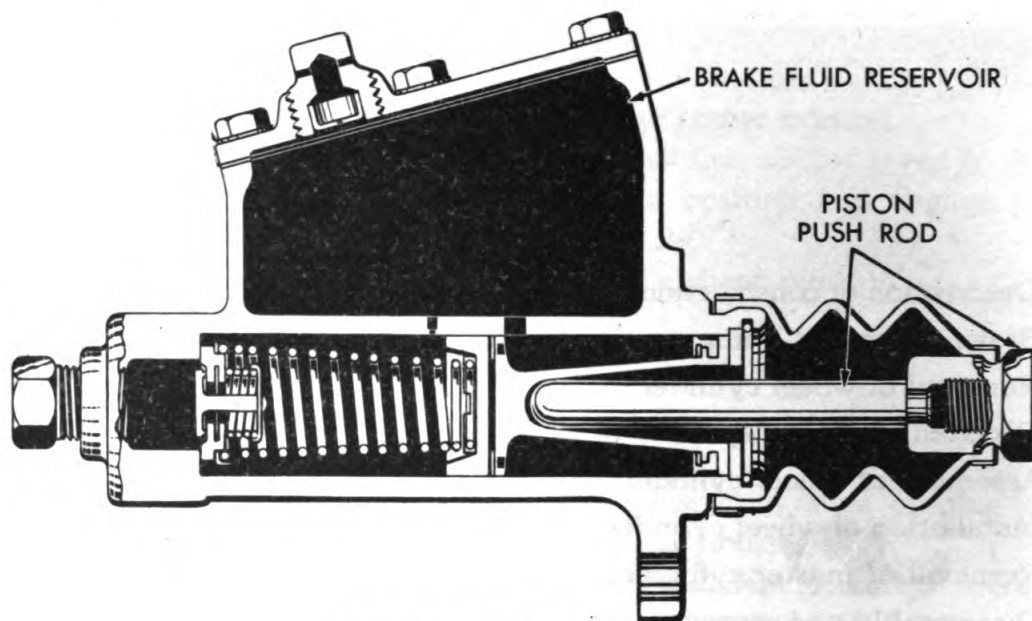
a. **Foot Brakes** (fig. 79). The master cylinder is mounted on the chassis forward of the brake pedal. An adjustable push rod connected to the pedal actuates the master cylinder piston. Any fluid lost from the system on brake application is automatically replenished with fluid from the supply tank at the top of the master cylinder assembly. The master cylinder has a straight bore while each wheel cylinder bore has different front and rear diameters so that more hydraulic pressure will be applied to the rear shoe of each wheel than is applied to the front shoe of the same wheel. A compressed woven lining is riveted to the brake shoes. The brake drums are mounted to the wheel drums and can be removed without removing the hubs.

b. **Hand Brake**. The hand brake is mounted at the rear of the transmission on the $\frac{3}{4}$ ton, 4 x 4 truck, and at the rear of the transfer case on the $1\frac{1}{2}$ ton, 6 x 6 truck. The band is lined with a compressed woven lining and is adjustable to compensate for lining and drum wear.

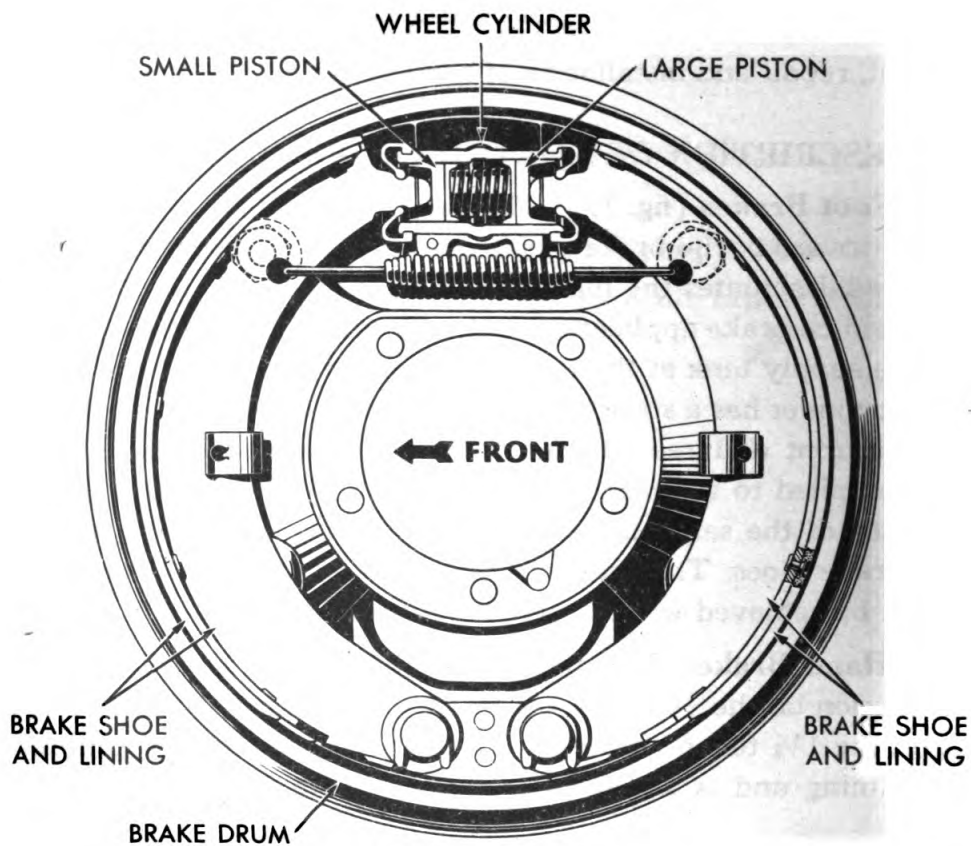
69. BRAKE DRUM AND LINING REPAIRS.

a. **Remove Brake Drum and Shoes** (fig. 80). Jack up the vehicle

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BRAKE MASTER CYLINDER

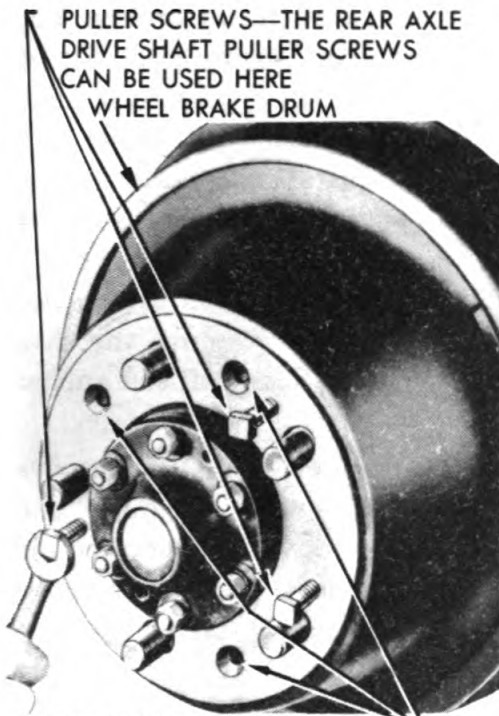


WHEEL BRAKE

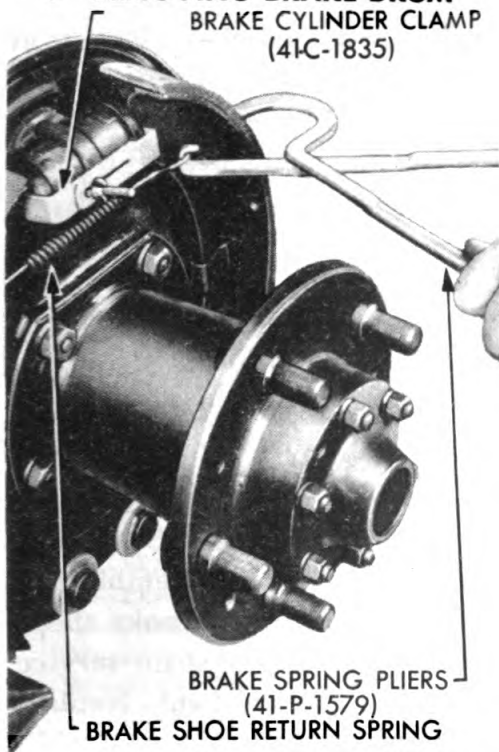
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Figure 79—Wheel Brake and Master Cylinder

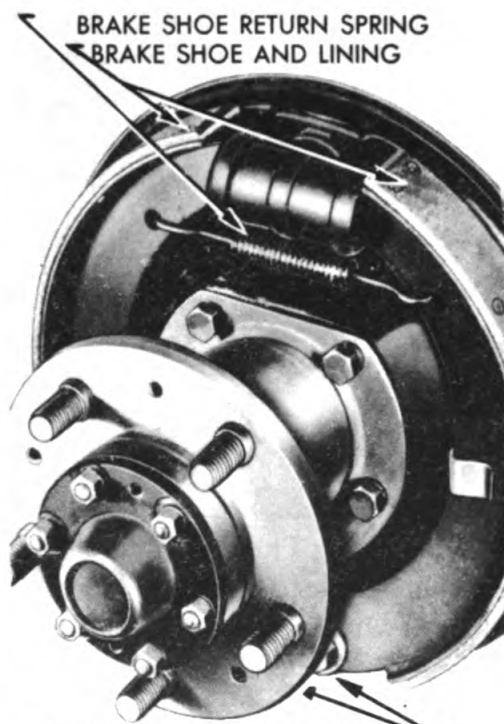
BRAKES



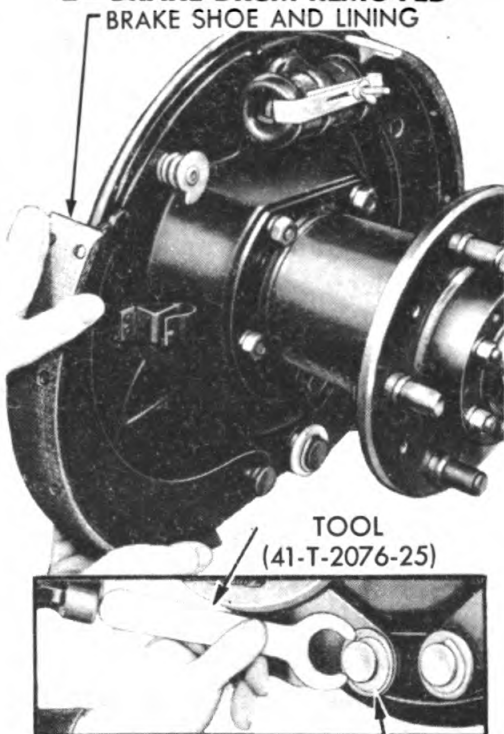
BRAKE DRUM TO HUB SCREWS REMOVED
1—REMOVING BRAKE DRUM
BRAKE CYLINDER CLAMP (41C-1835)



3—REMOVING SHOE RETURN SPRING



ANCHOR BOLT "C" WASHERS
2—BRAKE DRUM REMOVED
BRAKE SHOE AND LINING



4—REMOVING BRAKE SHOE

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ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)

so the wheels are free and remove the wheel and tire assembly. Remove the three large screws that attach the drum to the hub. Strike the screwdriver with a hammer to break them loose, and turn them out. Install puller screws in the holes provided in the drum (1, fig. 80) and force the drum off the hub (2, fig. 80). Install a cylinder clamp on the wheel cylinder to avoid accidentally forcing the pistons out of the cylinder. Remove the shoe return spring with brake spring pliers (3, fig. 80). Remove the shoe anchor bolt C-washers from the anchor bolts with the special lock washer tool (4, fig. 80). Remove the shoe oil washer retainers and oil washers and slide the shoes off the anchor bolts.

b. **Remove and Disassemble Brake Support** (fig. 81). Remove the brake cylinder inlet connection bolt and remove the outer and inner gaskets. The front brake support is attached with cap screws and the rear support is attached with rivets. To remove the front support unscrew the five cap screws and remove the support, oil slinger and gasket. Remove the rivets to remove the rear axle brake support, oil slinger and gasket. Remove the shoe anchor bolts.

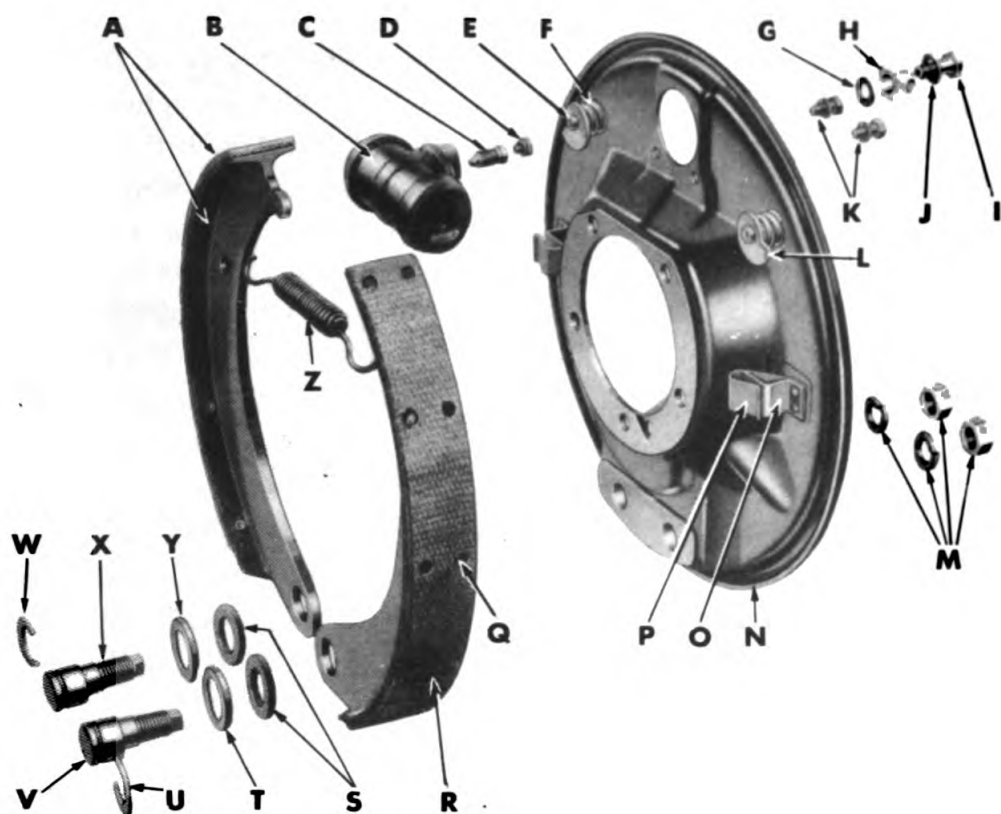
c. **Inspect and Reline Brake Shoes.** Examine the brake shoe assemblies for excessive lining wear, loose rivets and worn or damaged shoes. Replace the shoes if they are damaged or worn excessively at the anchor bolt holes or at the ends that contact the wheel cylinder pistons. If only the lining of the shoes is damaged or worn, drill out the rivets and install new lining with brake relining machine (40-M-3).

d. **Inspect and Regrind Brake Drums.** Examine the brake drums for cracks, damage or scoring and burning of the lining contacting surface. Replace the drums if the damaged surface requires the removal of more than 0.020 inch of material from the drum. If the drum braking surface is not too deeply cut, scored or otherwise damaged, regrind the brake drums on a lathe (40-L-15). Grind the drums assembled to the hub to which they were originally assembled as the drums are matched with the hubs.

e. **Inspect and Repair Support Assembly** (fig. 81). Straighten the support assembly if it is slightly bent. Replace the assembly if it is severely bent, in order to prevent misalignment of the brake shoes. The brake shoe guides and guide springs are not supplied for service. These guides can be reshaped if they are only slightly bent. Replace the brake support assembly if the guides are severely damaged. Also replace the support if it is cracked or broken or the attaching holes are elongated or out of line.

f. **Assemble and Install Support Assembly** (fig. 81). Insert the

BRAKES



- A**—BRAKE SHOE AND LINING
- B**—WHEEL CYLINDER ASSEMBLY
- C**—WHEEL CYLINDER BLEEDER SCREW
- D**—WHEEL CYLINDER BLEEDER SCREW CAP SCREW AND LOCK WASHER
- E**—BRAKE SHOE ADJUSTER PIN
- F**—BRAKE SHOE ADJUSTER PIN CAM SPRING
- G**—WHEEL CYLINDER INLET CONNECTION GASKET
- H**—WHEEL CYLINDER INLET CONNECTION
- I**—WHEEL CYLINDER INLET CONNECTION BOLT
- J**—WHEEL CYLINDER INLET CONNECTION BOLT GASKET
- K**—WHEEL CYLINDER ATTACHING SCREWS AND LOCK WASHERS
- L**—BRAKE SHOE ADJUSTER PIN CAM
- M**—BRAKE SHOE ANCHOR BOLT NUTS AND LOCK WASHERS
- N**—WHEEL BRAKE SUPPORT
- O**—BRAKE SHOE GUIDE
- P**—BRAKE SHOE GUIDE SPRING
- Q**—BRAKE SHOE LINING RIVET
- R**—BRAKE SHOE LINING
- S**—BRAKE SHOE ANCHOR BOLT OIL WASHERS
- T**—BRAKE SHOE ANCHOR BOLT OIL WASHER RETAINER
- U**—BRAKE SHOE ANCHOR BOLT "C" WASHER
- V**—BRAKE SHOE ANCHOR BOLT
- W**—BRAKE SHOE ANCHOR BOLT "C" WASHER
- X**—BRAKE SHOE ANCHOR BOLT
- Y**—BRAKE SHOE ANCHOR BOLT OIL WASHER RETAINER
- Z**—BRAKE SHOE RETURN SPRING

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Figure 81—Wheel Brake Support Disassembled

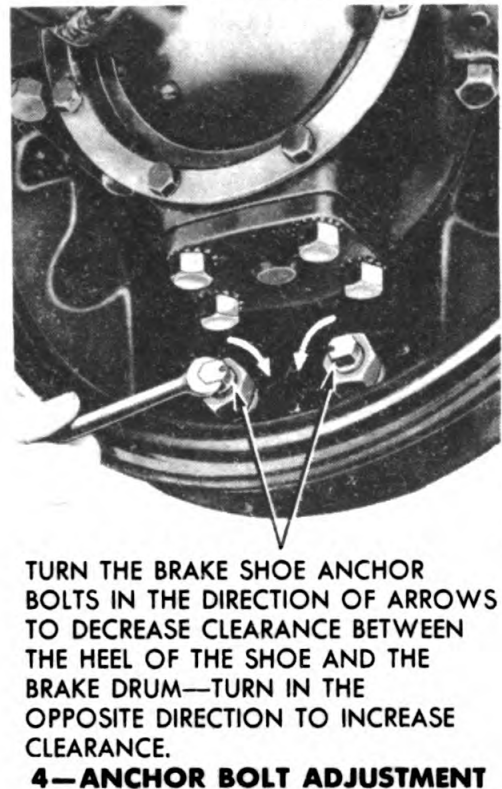
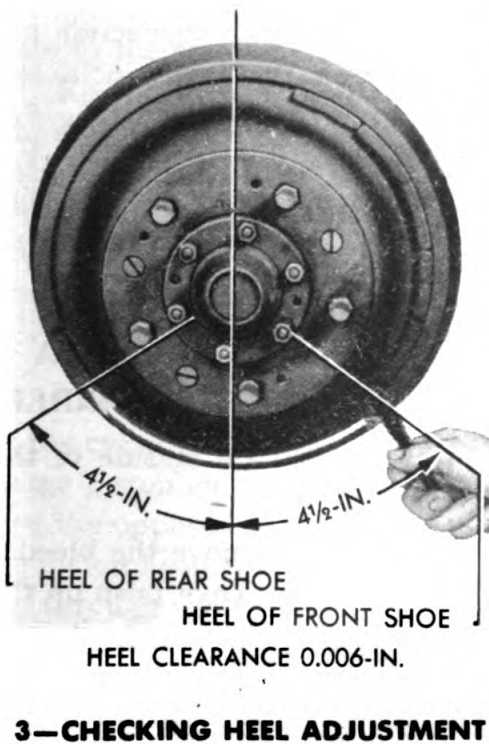
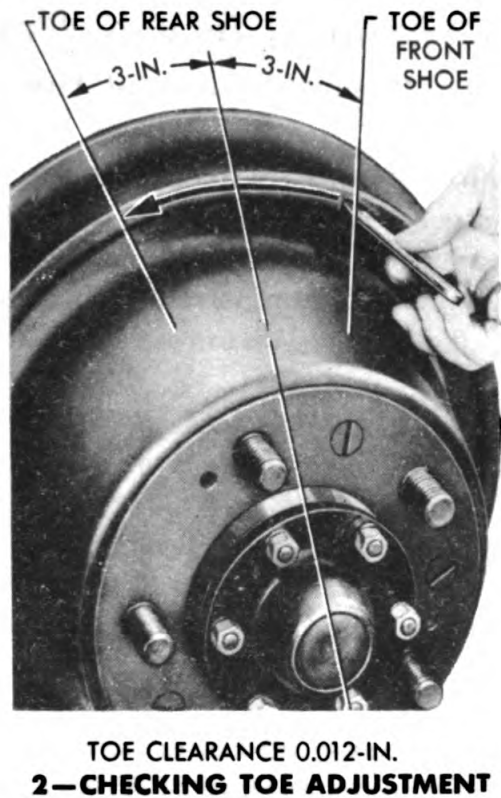
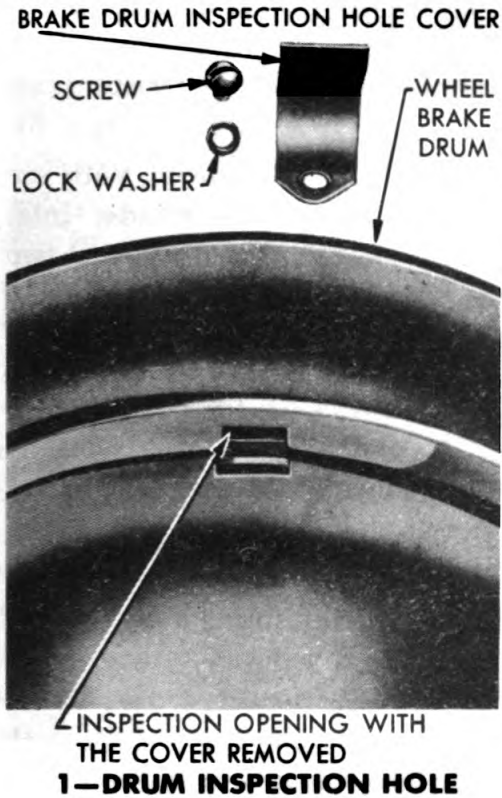
ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)

anchor bolts and install the lock washers and nuts to hold the bolts in place. Move the anchor bolts so the dots on the heads of the bolts are adjacent and tighten the bolt nuts. Attach the brake cylinder with the two cap screws assembled with lock washers. Attach the support and oil slinger to the housing and use a new gasket between the support and housing. Rivet the support to the rear axle housing and attach the support to the front axle housing with the cap screws assembled with lock washers. Install the brake cylinder inlet connection bolt with new inner and outer gaskets to attach the brake hose to the cylinder.

g. Install Brake Shoes and Drum. Soak the felt washers in lubricant and remove all surplus lubricant from them. Install the washers and retainer on the shoe anchor bolts. Then install the shoes on the bolts and install the retaining C-washer with tool (41-T-2076-25). Insert the ends of the brake shoes into the brake cylinder pistons and install brake shoe return spring with the brake spring pliers (41-P-1579). Coat the brake drum and the hub with water pump grease where they contact, and line up the drum with the screw holes in the hub. Then drive the drum into place over the wheel studs. Coat the three attaching screws with water pump grease, and tighten them securely.

h. Adjust Brakes (fig. 82). Remove cover from inspection hole in drum (1, fig. 82). Adjust brake shoe cam so that 0.012-inch clearance exists between the brake shoe toe and the brake drum (2, fig. 82). If the clearance between brake shoe and drum at the heel is 0.006-inch (3, fig. 82), when the clearance at the toe is adjusted to 0.012 inch, an anchor bolt adjustment is not required. If heel clearance is not 0.006-inch, loosen anchor bolt lock nut and turn anchor bolt in the direction indicated by arrow (4, fig. 82) to decrease clearance, and in the opposite direction to increase clearance. Move the anchor bolt gradually and at the same time watch the clearance at the toe of the shoe and keep it at 0.012-inch as the anchor bolt adjustment progresses. When the two adjustments (0.006 in. at the heel and 0.012 in. at the toe) are obtained, the brake shoes will be properly centralized. When the shoe has been adjusted, hold the anchor bolt from turning and securely tighten the lock nuts. Revolve the brake drum and turn the brake shoe adjusting cam until the shoe contacts the drum and causes brake to drag, then turn the cam in the opposite direction just enough to eliminate the brake drag. This is necessary to assure sufficient pedal. Adjust all brake shoes in the same manner. Install inspection hole cover and the wheel and tire assembly.

BRAKES



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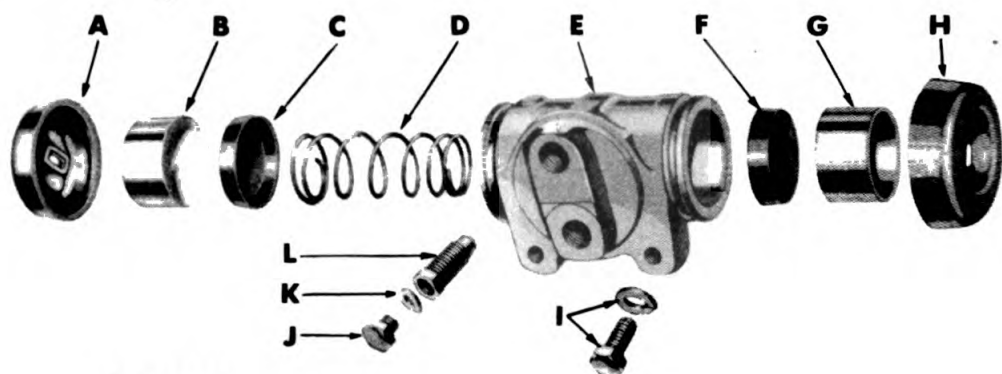
Figure 82—Adjusting Wheel Brake

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70. REMOVAL OF WHEEL CYLINDER.

a. Remove Wheel and Tire Assembly and Brake Drum (par. 69 a in part).

b. Remove Wheel Cylinder. Remove the brake spring with the brake spring pliers (41-P-1579). Remove the wheel cylinder inlet connection bolt and the inner and outer gaskets. Remove the two cylinder mounting screws and remove the cylinder.



- A—BOOT
- B—PISTON (LARGE) REAR
- C—PISTON CUP (LARGE) REAR
- D—PISTON CUP SPRING
- E—BODY
- F—PISTON CUP (SMALL) FRONT
- G—PISTON (SMALL) FRONT
- H—BOOT
- I—WHEEL CYLINDER ATTACHING SCREW AND LOCK WASHER (2)
- J—BLEEDER SCREW CAP SCREW
- K—BLEEDER SCREW CAP SCREW LOCK WASHER
- L—BLEEDER SCREW

RA PD 53490

Figure 83—Wheel Cylinder Disassembled

71. DISASSEMBLY AND INSPECTION OF WHEEL CYLINDER.

a. Clean Wheel Cylinder Assembly. Wash the outside of the cylinder with alcohol before it is disassembled.

b. Disassemble Wheel Cylinder (fig. 83). Remove the bleeder screw. Roll the boots off each end of the cylinder. Then push on the smaller piston and force all the cylinder parts out of the opposite end of the cylinder. Clean all parts in alcohol.

c. Inspect Body (fig. 83). Inspect the body for cracks or sand holes and examine the bores for scores or excessive wear. Lap the bores if the wear or scoring is slight, but if the clearance between the pistons and bores will be increased beyond 0.003 inch, rebore and

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install a 0.010-inch oversize piston. Measure the diameter of the bores and the pistons. Install a new piston in either bore if the difference in measurement is greater than 0.003-inch clearance and provided the small piston diameter is less than 1.248 inches or the large piston diameter is less than 1.373 inches. Replace the body if the difference in measurement is greater than 0.003-inch clearance and the small piston diameter is greater than 1.248 inches or the large piston size is greater than 1.373 inches, as in such case the body has already been fitted with the 0.010-inch oversize piston and there are no larger pistons available.

d. Inspect Wheel Cylinder Parts (fig. 83). Examine the pistons for scoring and cracks and measure them with a micrometer (41-C-307) to determine if they are excessively worn. If the standard piston for the smaller bore of the body measures less than 1.247 inches, replace the piston. If the smaller bore of the body is fitted with a 0.010-inch oversize piston and the piston measures less than 1.258 inches, replace the piston. Replace the piston for the large bore of the body, if the standard piston measures less than 1.372 inches or if the 0.010-inch oversize piston measures less than 1.383 inches. Inspect the piston cups for a scuffed, grooved or worn condition and for cracks or deterioration. Replace the cups if there is any condition, no matter how slight, that might cause leakage. The cup has sufficient flare at the rim to operate in the standard or oversize bores satisfactorily.

e. Recondition Wheel Cylinder Bores. If the bores are slightly rough, scored, worn or burned, lap the bore with a felt lap and fine grinding compound until the bore is smooth. If the bores are deeply scored or worn, grind them with the grinder (40-G-103) and fit new 0.010-inch oversize pistons. Fit the new pistons to the bore so the clearance is not less than 0.001 inch and does not exceed 0.003 inch.

72. ASSEMBLY OF WHEEL CYLINDER.

a. Assemble Wheel Cylinder Cups and Pistons (fig. 83). Coat all of the cylinder parts and the cylinder bores with brake fluid. Insert the large piston cup into the cylinder bore with the cup flange facing toward the opposite end of the cylinder. Then insert the large piston so the piston head contacts with the piston cup. Insert the piston cup spring through the small bore of the cylinder. Install the small cup with the flange facing toward the center of the cylinder and install the piston with the head contacting the cup.

b. Install Boots and Bleeder Screw (fig. 83). Hold the cylinder pistons in the cylinder and roll the boots over the end of the cylinder. Install the bleeder screw and then install the bleeder screw cap screw with a new lock washer.

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)****73. INSTALLATION OF WHEEL CYLINDER.**

a. **Install Wheel Cylinder.** Attach the wheel cylinder to the brake support with the two cap screws and lock washer. Install a new outer gasket on the inlet connection bolt and insert the bolt through the brake hose connection. Then install a new inner gasket on the bolt and connect the hose to the wheel cylinder. Insert the ends of the brake shoes in the slots of the cylinder boots and install the brake spring with the pliers (41-P-1579). Install brake drum and wheel and tire assembly.

b. **Bleed Brake Lines** (par. 77 c).

74. REMOVAL OF MASTER CYLINDER.

a. **Disconnect Master Cylinder.** Remove the brake pedal pull back spring with the brake spring pliers (41-P-1579). Remove the cotter pin from the end pin that attaches the master cylinder push rod to the brake pedal and then remove the end pin. Disconnect the brake tube from the master cylinder.

b. **Remove Master Cylinder.** Open the clip on the master cylinder screw that holds the fuel tube and move the tube out of the way. Then remove the screws that attach the master cylinder to the clutch housing and remove the cylinder.

75. DISASSEMBLY AND INSPECTION OF MASTER CYLINDER.

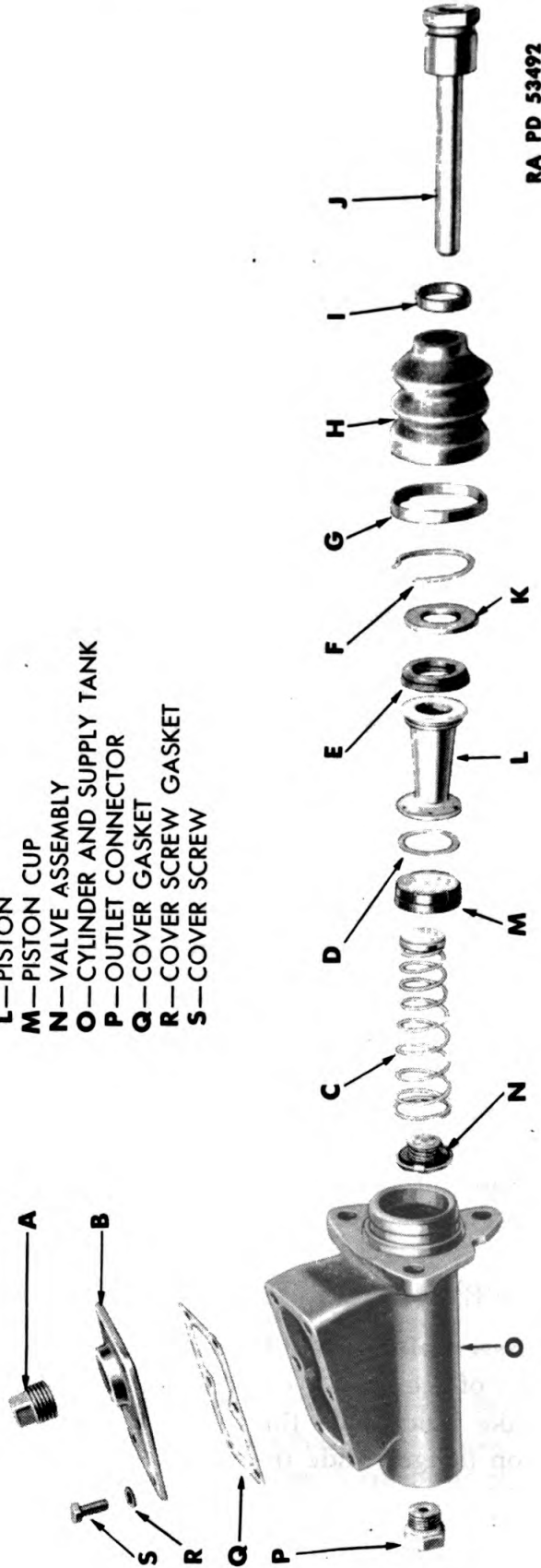
a. **Clean Master Cylinder Assembly.** Remove the master cylinder filler plug and drain out brake fluid. Clean the outside of the cylinder with alcohol before proceeding with the disassembly.

b. **Disassemble Master Cylinder** (fig. 84). Pry the large end of the master cylinder boot off the shoulder of the master cylinder body and remove the push rod and boot assembly. Pry the piston stop lock wire out of the cylinder. Then hold the cylinder with the open end down and slide the operating parts out of the cylinder bore. Pull the inlet valve assembly from the piston return spring. Roll the piston secondary cup off of the piston. Remove the screws from the reservoir cover and remove the cover and gasket. Remove the cylinder outlet connection. Remove the boot strap and boot from the piston rod. Then clean all the cylinder parts in alcohol.

c. **Inspect Cylinder** (fig. 84). Inspect the cylinder for cracks and sand holes that will result in leakage. Inspect the cylinder bore for scores or excess wear. Lap the cylinder bore if the wear or scoring is

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- A—COVER PLUG
- B—CYLINDER AND SUPPLY TANK COVER
- C—PISTON RETURN SPRING
- D—PISTON WASHER
- E—PISTON SECONDARY CUP
- F—PISTON STOP LOCK WIRE
- G—BOOT STRAP (LARGE)
- H—BOOT
- I—BOOT STRAP (SMALL)
- J—PISTON PUSH ROD
- K—PISTON STOP
- L—PISTON
- M—PISTON CUP
- N—VALVE ASSEMBLY
- O—CYLINDER AND SUPPLY TANK
- P—OUTLET CONNECTOR
- Q—COVER GASKET
- R—COVER SCREW GASKET
- S—COVER SCREW



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Figure 84—Master Cylinder Disassembled

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slight, but if the clearance between the piston and the bore will be increased beyond 0.003 inch, grind the bore with the special grinder to fit a 0.010-inch oversize piston. Measure the diameter of the cylinder bore and then measure the piston diameter with a micrometer (41-C-307). Install a new piston if the difference in the measurements is greater than 0.003 inch and provided the piston diameter is less than 1.246 inches. Replace the cylinder if the difference in measurements is greater than 0.003 inch and the piston size is greater than 1.247 inches, as in such case the cylinder has already been fitted with the 0.010-oversize piston and there is no larger size piston available. Make sure the small port holes between the reservoir and cylinder bore are open and that the reservoir is clear of all dirt or other material.

d. **Inspect Master Cylinder Parts** (fig. 84). Examine the piston for scoring and cracks, and measure it for excess wear with a micrometer (41-C-307). The standard piston is machined to 1.247-inches diameter and the oversize to 1.258-inches diameter. Replace the piston if it is worn to the extent that the clearance between the piston and cylinder will be more than 0.003 inch. Inspect the piston cup and the piston secondary cup for a scuffed, grooved or worn condition and for cracks or deterioration. Replace the cups if there is any condition, no matter how slight, that might cause leakage. The cups are not supplied in oversize as the standard size cup has sufficient flare at the rim to operate in the standard or oversize bores. Replace the master cylinder boot if it is cracked or damaged so as to provide proper sealing of the cylinder parts against the entry of dirt and water.

e. **Recondition Master Cylinder Bore.** If the master cylinder bore is slightly rough, scored, worn or burned, lap the bore with a felt lap and fine grinding compound until the bore is smooth. If the bore is deeply scored or worn, grind it with the special grinder (41-G-103) and fit a new 0.010-inch oversize piston. Fit the new pistons to the bore so the clearance is not less than 0.001 inch and does not exceed 0.003 inch.

76. ASSEMBLY OF MASTER CYLINDER.

a. **Assemble Master Cylinder Cups and Pistons** (fig. 84). Coat the inside of the master cylinder and all of the internal cylinder parts with brake fluid. Roll the piston secondary cup on the piston over the piston flange. Slide the lips of the valve assembly over the large end of the piston return spring coil wires. Hold the master cylinder with the bore facing up and insert the piston return spring with the valve toward the bottom of the cylinder. Insert the piston cup into

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the cylinder with the lip of the cup down toward the spring. Install the piston washer on the cup and then insert the piston, with end having the series of holes toward the piston washer. Place the piston stop against the end of the piston and push the piston assembly into the cylinder so that the groove for the piston stop lock wire is uncovered. Install the piston stop lock wire.

b. Assemble and Install Push Rod (fig. 84). Slide the small boot strap over the piston push rod and onto the hexagonal end of the rod. Slide the small end of the boot in place against the hexagonal end and move the strap over the boot. Install the push rod and boot assembly on the master cylinder by inserting the end of the rod into position and pushing the large end of the boot over the collar of the cylinder. Then slide the large strap over the boot and fasten the boot to the cylinder.

c. Check Piston Location and Install Cover and Cylinder Connection. Before installing the supply tank cover, check the location of the piston for proper assembly of the parts. Insert a wire through the smaller of the two holes in the bottom of the brake fluid supply tank. If any obstruction to the passage of the wire is felt, a portion or all of the hole is covered by the rubber piston cup. This hole must be open when the cylinder is in the released position, for proper operation of the master cylinder. If it is not open, remove the piston and cups and check for distortion of the cup or use of an improper cup in making repairs and improper assembly of the parts. Insert a wire through the large hole in the bottom of the supply tank to make sure it is free of any obstruction. If it is partially or wholly closed off, recheck the assembly of the parts to the cylinder. Attach the supply tank cover and a new gasket to the cylinder with the cap screws and lock washers. Install the outlet connector.

77. INSTALLATION OF MASTER CYLINDER.

a. Install Master Cylinder. Attach the master cylinder to the clutch housing with the attaching screws and lock washers. Assemble the fuel line clip to the master cylinder attaching screw on the side next to the engine. Then attach the fuel tube to the clip and bend the clip over the tube.

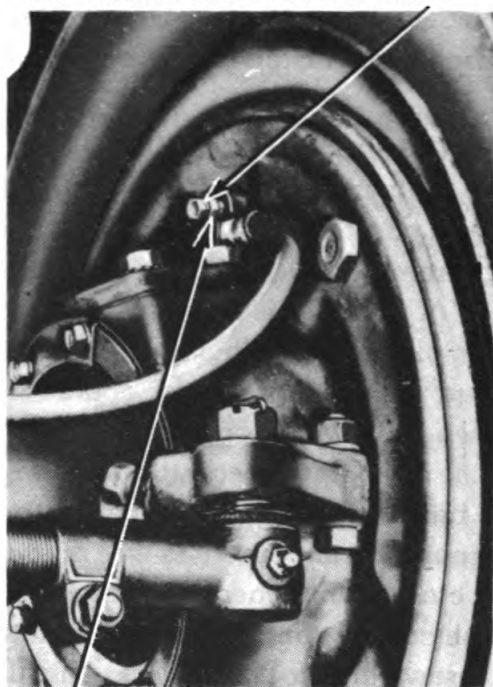
b. Connect and Adjust Master Cylinder. Connect the brake tube to the master cylinder. Then install the push rod and pin and lock in place with a new cotter pin. Connect the pull back spring to the brake pedal. Loosen the lock nut on the pedal stop screw and turn the stop screw in the bracket until the pedal has $\frac{7}{16}$ -inch free travel. Tighten lock nut. If free play cannot be created by backing out the stop screw,

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adjust the stop screw so that the pedal does not strike the engine support when the brakes are released, and adjust the master cylinder piston rod. Loosen the lock nut at the front end of the piston rod between the pedal and the master cylinder and turn the master cylinder piston push rod counterclockwise until the pedal has $\frac{7}{16}$ inch travel.

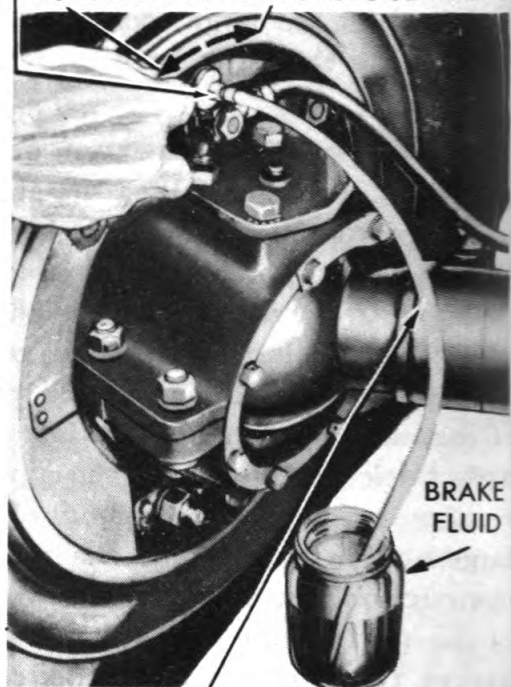
c. **Bleed Brake Lines (fig. 85).** Partially fill the brake filler (41-F-2982) with hydraulic brake fluid. Attach air hose to connection at top of the filler and apply 25 pounds of air pressure to the filler tank.

WHEEL CYLINDER BLEEDER SCREW
CAP SCREW AND LOCK WASHER



BLEEDER SCREW (VALVE)

WHEEL CYLINDER BLEEDER SCREW
TO OPEN VALVE TO CLOSE VALVE



BLEEDER HOSE

RA PD 308894

Figure 85—Bleeding Brakes at Wheel Cylinder

Remove the plug from the top of the master cylinder. Place end of filler hose in master cylinder, open the shut-off valve in the filler hose slightly and fill the master cylinder to top of the opening. Install tapped fitting in master cylinder filler opening. Install threaded nipple into tapped fitting and connect the filler hose to the nipple. Before tightening the hose to nipple connection, open the shut-off valve slightly and when fluid, free of air, is forced out the loose connection, tighten the connection and open the shut-off valve fully. Remove the cap screw from the wheel cylinder bleeder screw (fig. 85) and attach the bleeder tube (41-T-4170). Submerge the free end of the bleeder tube in brake fluid in a receptacle. Open the bleeder screw and allow fluid to flow

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into the receptacle until fluid coming from the brake system is clear and free of air bubbles. Then close the bleeder screw securely, remove the bleeder tube and install cap screw. When the last wheel cylinder has been completely bled and while the bleeder screw is still open and the bleeder tube is still in the receptacle of fluid, close the shut-off valve in the filler hose and disconnect the hose from the master cylinder. Push the brake pedal all the way down and hold it down while the bleeder screw at the wheel cylinder is being closed. Then release the brake pedal. This will lower the fluid in the master cylinder to approximately $\frac{3}{4}$ inch below the top of the filler opening. Remove fittings and install filler plug in master cylinder.

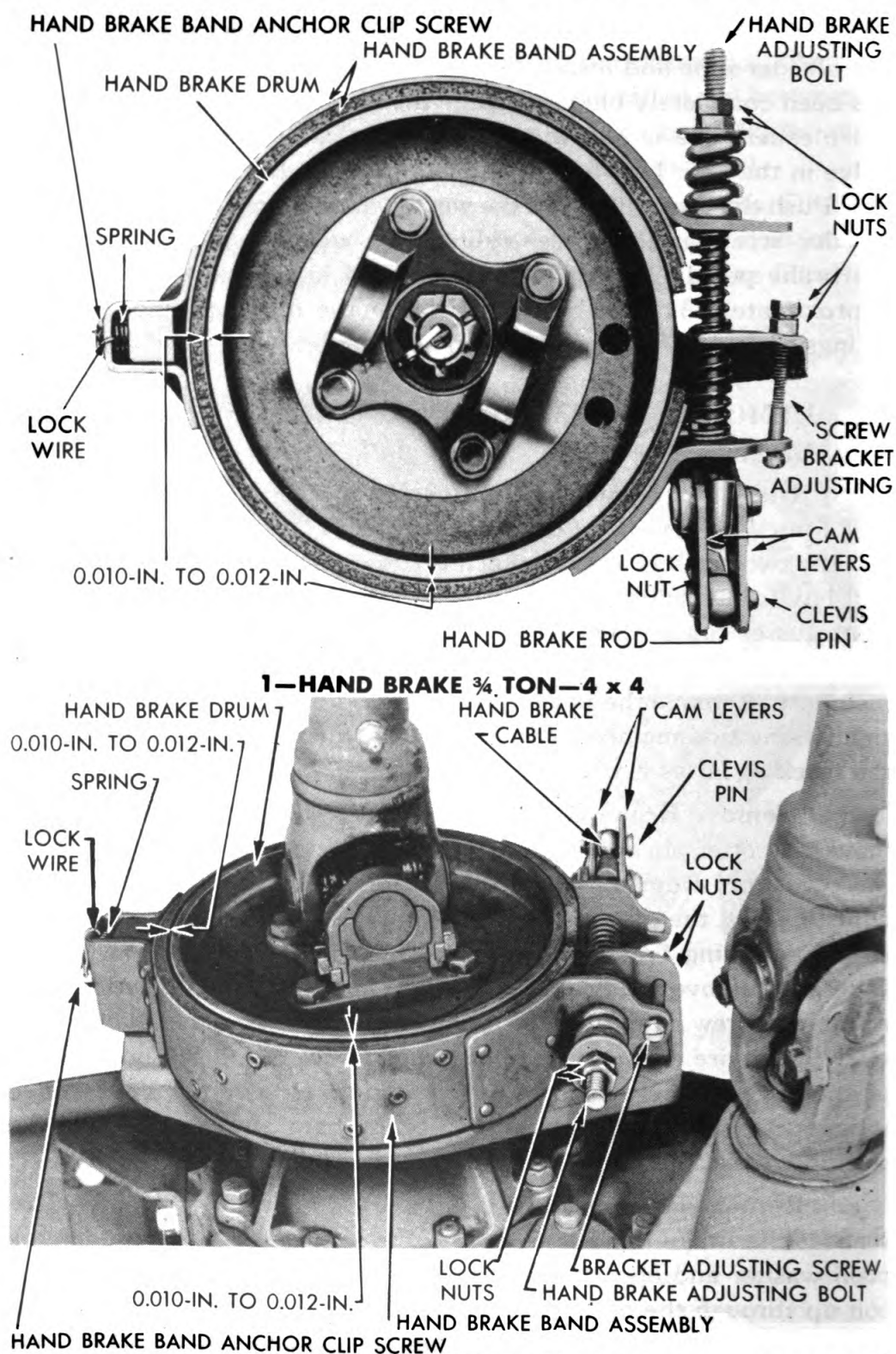
78. REMOVAL, REPAIR AND INSTALLATION OF HAND BRAKE.

a. **Disconnect and Move Intermediate Frame Cross Member ($\frac{3}{4}$ Ton, 4 x 4 Truck) (Except Ambulance).** Remove the two bolts and the two cap screws that attach the rear gusset to the cross member and left frame side member. Also remove the two cross member to front gusset cap screws. Remove the two bolts and nuts that attach the cross member to the upper flange of the left and right frame side members. Remove the two large bolts and nuts from cross member to right frame side member. Move the cross member toward the rear of the truck as far as it will go.

b. **Remove Brake Band ($\frac{3}{4}$ Ton, 4 x 4 Truck) (fig. 86).** Remove the cotter pin and yoke pin from the hand brake rod and remove the cotter pin from the spacer link stud. Remove the lock nut and adjusting nut, the plain washer and the operating spring from the top of the adjusting bolt. Pull the adjusting bolt down and out of the band and remove the two adjusting bolt springs. Remove the bracket adjusting screw nuts and the adjusting screw. Remove the anchor screw lock wire and remove the anchor screw. Slide the brake band off the anchor bracket and at the same time remove the small coiled spring that is located between the brake band anchor clip and the anchor bracket.

c. **Remove Brake Band (1 $\frac{1}{2}$ Ton, 6 x 6 Truck) (fig. 86).** Disconnect the brake cable and remove the lock and adjusting nuts, the plain washer and operating spring from the adjusting bolt. Push the bolt up through the brake band and the bracket. Remove the adjusting bolt from the brake cam lever pin and remove the adjusting bolt springs. Remove the bracket adjusting screw nuts and remove the screw. Remove the brake anchor screw lock wire and remove the screw. Slide the brake band off the anchor bracket and at the same time,

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Figure 86—Hand Brake Assembly

BRAKES

remove the coiled spring, located between the brake band anchor clip and the anchor bracket.

d. Remove Brake Drum. Pry the universal joint clamp bolt nut lock open and remove the nuts from the bolts. Remove the clamp bolts and locks and remove the clamps from the universal joint, slide the splined yoke on the propeller shaft as far as it will go and move the propeller shaft to one side out of the way. Remove cotter pin and the nut that holds the universal joint companion flange on the transmission main shaft. Drive the brake drum and flange assembly off the shaft. Then remove the four bolts and nuts that hold the flange and drum assembly together.

e. Clean Metal Parts. Clean all metal parts with dry-cleaning solvent, and dry with compressed air. Do not let the lining contact any fluid, if it is not being replaced, but clean the metal brake band with a rag dampened with cleaner, if necessary to remove grease or dirt. Roughen the lining with a wire brush before installing.

f. Inspect Lining. Inspect the lining for excess or uneven wear, grooving, improper or loose riveting and damage by lubricants or other fluids. Replace the lining if there is any indication that it is unfit for further use.

g. Inspect Drum and Universal Joint Flange. Examine the drum for cracks or other metal or machining operation irregularities. Replace the drum if it is deeply scored or warped or if it is otherwise unsatisfactory, as it is not practical to turn this drum to remove scores or to make other repairs. Replace the universal joint flange if it is worn, cracked or does not fit tight on the transmission main shaft.

h. Inspect Hand Brake Operating Parts. Examine all of the hand brake operating parts for wear. Also, inspect for any misalignment or twisting of the parts and examine the screw threads for condition.

i. Reline Brake Band. Punch the old rivets out of the brake band, using the brake machine (40-M-3). Clean the band of all rough spots and remove any burns around rivet holes and clean all grease off band before making replacement of the lining. Use lining of the correct length (2-in. wide; 24-in. long) and rivet the ends of the lining to the band first. Then rivet the balance of the lining alternately from the ends toward the center.

j. Assemble and Install Brake Drum. Assemble the brake drum to the universal joint flange with the four bolts, nuts and lock washers. Install the drum and flange assembly on the shaft. Install the companion flange washer and nut. Hold the flange, tighten the nut and lock in place with a new cotter pin.

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k. **Install Brake Band.** Install the hand brake anchor spring in the brake support and guide the brake band anchor clip over the spring. Compress the spring with a screwdriver while installing the brake band to prevent distortion of the spring. Install the anchor screw but do not tighten, as the brakes must be adjusted.

l. **Install Adjusting Bolt and Connect Brake ($\frac{3}{4}$ Ton, 4 x 4 Truck)** (fig. 86). Place the brake cam levers in proper position on the adjusting bolt and insert the bolt through the lower flange of the brake band with the open end of the hook to the rear. Install one of the adjusting bolt springs between the brake band lower flange and the adjusting screw bracket. Install the remaining adjusting bolt spring between the adjusting screw bracket and the brake band upper flange. Then install the brake operating spring and washer. Compress the brake band flanges and install the adjusting bolt nut and lock nut. Insert the bracket adjusting screw through the brake band lower flange and through the adjusting screw bracket. Install the adjusting screw nut, lock washer and lock nut. Connect the spacer link stud and lock in place with a new cotter pin. Install the yoke pin to connect the hand brake rod and install a new cotter pin.

m. **Install Adjusting Bolt and Connect Brake (1½ Ton, 6 x 6 Truck)** (fig. 86). Insert the end of the adjusting bolt between the brake cam levers and over the pin. Then insert the bolt with the cam levers attached, through the brake band upper flange and install one of the bolt springs between the brake flange and the adjusting screw bracket. Install the remaining adjusting bolt spring between the adjusting screw and the brake band lower flange. Then install the operating spring and washer. Compress the band flanges and install the adjusting bolt nut and lock nut. Install the bracket adjusting screw through the upper flange and through the adjusting screw bracket. Install the adjusting screw nut, lock washer, lock nut. Loosen the lock nut at the front end of cable and adjust the cable so that, with the hand lever in the fully released position, the cam levers bear squarely against the brake band. Install the clevis and cotter pin and tighten the lock nut.

n. **Connect Universal Joint.** Slide the splined yoke of the universal joint into place against the flange and install the universal joint clamps. Install the clamp bolts with the clamp bolt locks under the heads of the bolts. Install the bolt nuts with new locks under the nuts.

o. **Connect Intermediate Cross Member.** Move the intermediate cross member into position and install the two bolts and nuts with lock washers to attach the cross member to the frame upper flange.

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p. Adjust Hand Brake (fig. 86). Adjust the anchor clip screw so there is 0.010 to 0.012-inch clearance between the drum and the lining at the anchor. Install a lock wire through the anchor clip and screw. Back off the adjusting bolt lock nuts until free. Adjust the bracket adjusting screw so there is 0.010-inch to 0.012-inch clearance between the drum and the top of the band, and lock the nuts together. Turn adjusting bolt nuts until the bracket adjusting screw is just relieved of tension. Tighten lock nuts. **NOTE:** *If a new band and lining assembly does not form a true circle, it may be necessary to alter the adjustment slightly to establish clearance all the way around the drum. In that case readjust the band after the lining has worn to a true circle.*

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CHAPTER 3
CHASSIS (Cont'd)

Section IV

STEERING

	Paragraph
Description of construction	79
Removal of steering gear assembly	80
Disassembly and inspection of steering gear	81
Assembly of steering gear	82
Installation of steering gear assembly	83

79. DESCRIPTION OF CONSTRUCTION.

a. The steering tube and worm assembly is mounted on two tapered roller bearings (fig. 87). The bearings are adjustable for end thrust by shims at the lower end of the worm. The steering gear shaft is carried in two plain bushings and the end thrust is controlled by an adjusting screw at the inner end of the shaft. Worm and sector mesh is adjustable by an eccentric sleeve in the housing bracket.

80. REMOVAL OF STEERING GEAR ASSEMBLY.

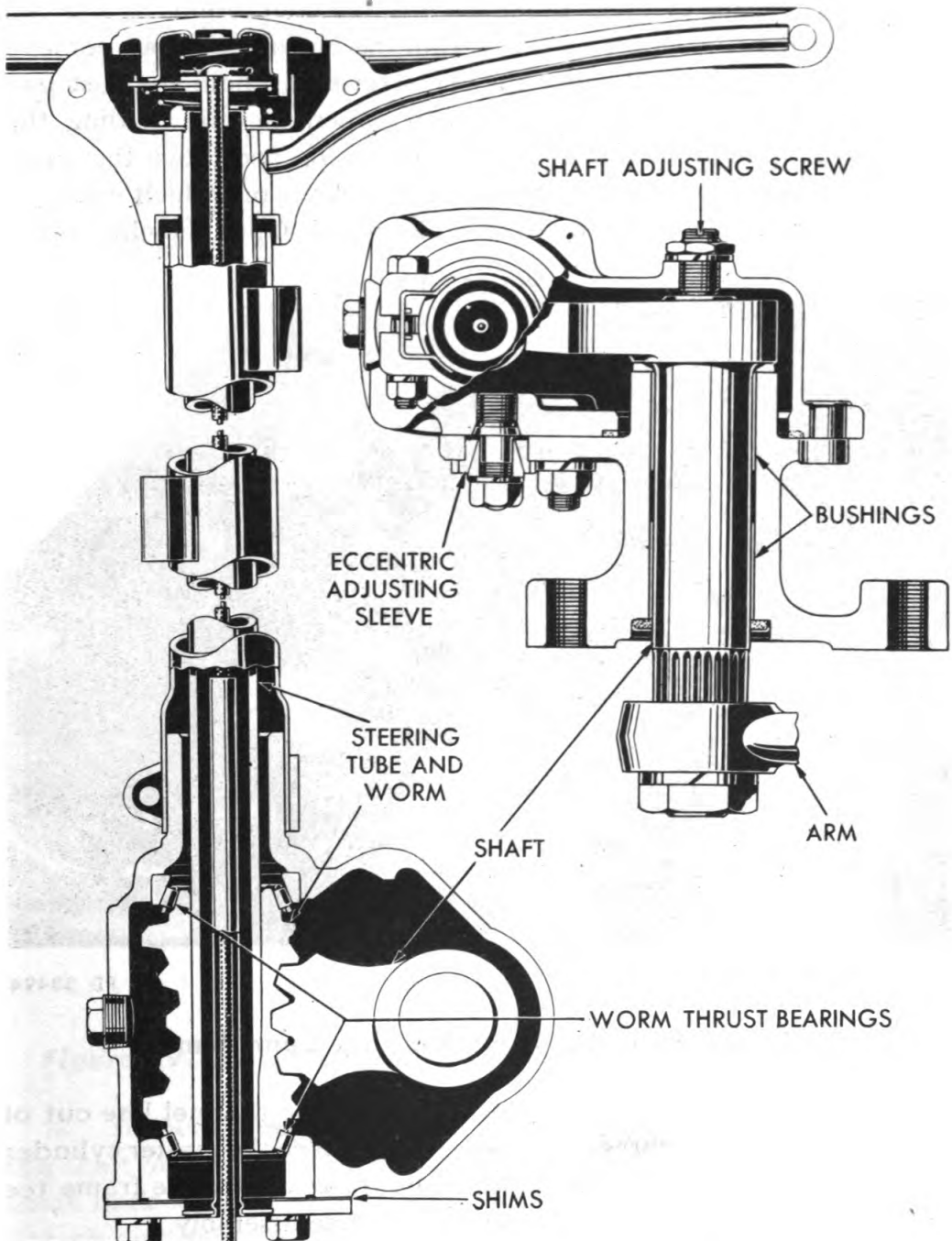
a. **Remove Horn Button and Steering Wheel.** Pull the horn wires apart at the connector located at the bottom of the steering gear. Press down on the horn button and rotate it clockwise as far as it will go. Release the pressure and the button will pop out. Pull the horn button, wire and spring assembly from the steering gear tube. Remove nut which holds the steering wheel on the tube. Pull steering wheel off the tube with puller (41-P-2954). Remove the two bolts and nuts that hold the steering post bracket clamps to the instrument panel. Remove the bolt and nut which hold the ground strap to the steering column jacket.

b. **Remove Floor Mat** (Ambulance only, par. 13 a).

c. **Remove Left Floor Plate** (par. 13 c in part).

d. **Disconnect Battery and Remove Ignition Coil.** Remove battery terminal from battery. Disconnect wires and ground strap from coil. Remove the nuts which attach the coil to the mounting bracket studs.

STEERING



RA PD 53517

Figure 87—Steering Gear Cross Section

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FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)**

e. **Remove Engine Dust Pan and Brake Master Cylinder.** Loosen the master cylinder brake tube to tee connections at the tee. Disconnect the chassis wiring cable from the engine dust pan, remove the clip, bolt and nut. Remove the cap screws that hold the dust pan to the frame and remove the dust pan. Open the clip holding the chassis wiring cable to the steering gear housing and move the cable out of the way. Remove cotter pin and the clevis pin which connects the master cylinder push rod to the brake pedal. Open the clip on the



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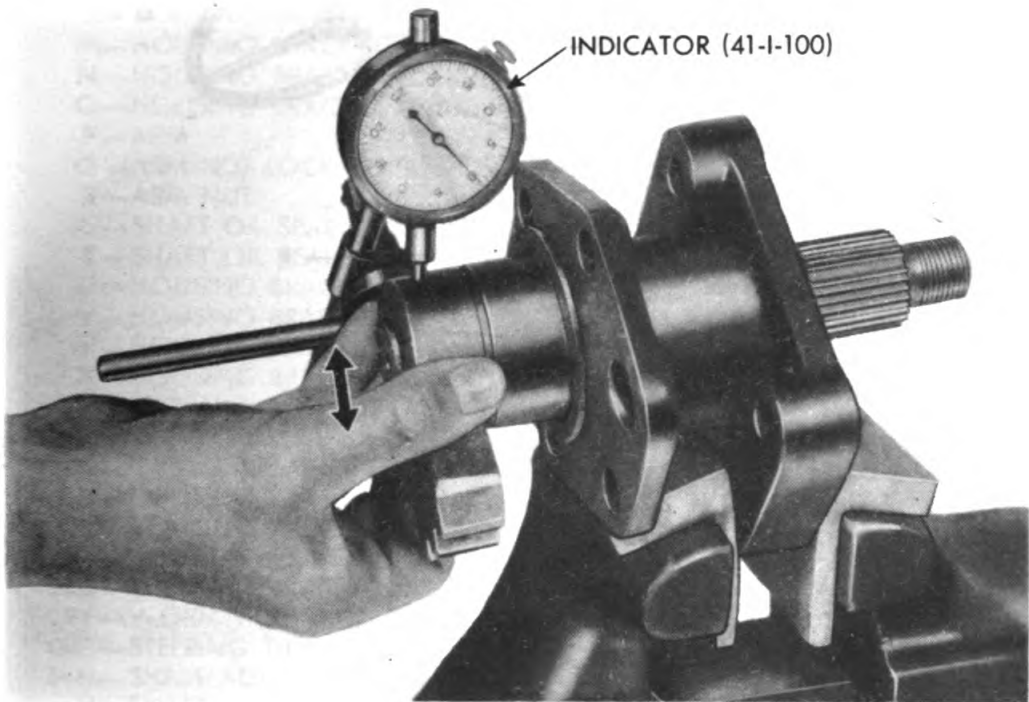
Figure 88—Removing Steering Gear Arm

master cylinder screw on the right side and move the fuel line out of the way. Remove the three cap screws which attach the master cylinder to the left motor support. Disconnect the brake line at the frame tee and remove the master cylinder and brake line assembly.

f. **Remove Steering Gear Assembly.** Remove nut from steering gear shaft. Disconnect drag link from the steering gear arm and pull arm off the shaft with puller (fig. 88). Remove the four cap screws which hold the steering gear to the frame. Move the steering gear toward the engine and turn the housing so that the steering gear shaft will clear the hole in the frame. Lower the assembly and pass it out between the frame front cross member and the front axle.

STEERING**81. DISASSEMBLY AND INSPECTION OF STEERING GEAR.**

a. **Remove Housing Bracket and Steering Gear Shaft (fig. 90).** Remove filler plug and drain lubricant from the housing and thoroughly clean the assembly in dry-cleaning solvent. Fasten the assembly in a vise by clamping the rectangular boss at the top of the housing in the vise. Remove nuts and lock washers which hold the housing bracket to housing and remove the bracket and adjusting sleeve lock ring, turning adjusting sleeve to loosen lock ring. Remove steering gear shaft from bracket.



RA PD 53495

Figure 89—Checking Steering Gear Housing Bracket Bushing

b. **Inspect Steering Gear Shaft and Bushings (fig. 89).** Wash the shaft and bushings thoroughly with dry-cleaning solvent. Put the shaft back in the bushings and check shaft and bushings for wear. Attach dial indicator to one end of the housing bracket and with the indicator plunger against the shaft, move the shaft to and from the indicator. The clearance at that end of the shaft will be shown on the indicator. Move the indicator to the other end of the housing and check the wear at the other end of the shaft. Measure the shaft diameter with micrometer (41-C-307) at the bearing surfaces. The original diameter is 1.373 to 1.374 inches. If wear exceeds 0.002 inch, replace the shaft. The bushing wear will be the measured clearance

This diagram illustrates the exploded view of a steering column assembly. The main components are labeled as follows:

- Steering Wheel:** Labeled with 'QQ'.
- Steering Column:** Labeled with 'E'.
- Steering Knuckle:** Labeled with 'G'.
- Steering Arm:** Labeled with 'H'.
- Steering Knuckle Pin:** Labeled with 'I'.
- Steering Knuckle Bush:** Labeled with 'J'.
- Steering Knuckle Nut:** Labeled with 'K'.
- Steering Knuckle Washer:** Labeled with 'L'.
- Steering Knuckle Bolt:** Labeled with 'M'.
- Steering Knuckle Nut:** Labeled with 'N'.
- Steering Knuckle Washer:** Labeled with 'O'.
- Steering Knuckle Bolt:** Labeled with 'P'.
- Steering Knuckle Nut:** Labeled with 'Q'.
- Steering Knuckle Washer:** Labeled with 'R'.
- Steering Knuckle Bolt:** Labeled with 'S'.
- Steering Knuckle Nut:** Labeled with 'T'.
- Steering Knuckle Washer:** Labeled with 'U'.
- Steering Knuckle Bolt:** Labeled with 'V'.
- Steering Knuckle Nut:** Labeled with 'W'.
- Steering Knuckle Washer:** Labeled with 'X'.
- Steering Knuckle Bolt:** Labeled with 'Y'.
- Steering Knuckle Nut:** Labeled with 'Z'.
- Steering Knuckle Washer:** Labeled with 'AA'.
- Steering Knuckle Bolt:** Labeled with 'BB'.
- Steering Knuckle Nut:** Labeled with 'CC'.
- Steering Knuckle Washer:** Labeled with 'DD'.
- Steering Knuckle Bolt:** Labeled with 'EE'.
- Steering Knuckle Nut:** Labeled with 'FF'.
- Steering Knuckle Washer:** Labeled with 'GG'.
- Steering Knuckle Bolt:** Labeled with 'HH'.
- Steering Knuckle Nut:** Labeled with 'II'.
- Steering Knuckle Washer:** Labeled with 'JJ'.
- Steering Knuckle Bolt:** Labeled with 'KK'.
- Steering Knuckle Nut:** Labeled with 'LL'.
- Steering Knuckle Washer:** Labeled with 'MM'.
- Steering Knuckle Bolt:** Labeled with 'NN'.
- Steering Knuckle Nut:** Labeled with 'OO'.
- Steering Knuckle Washer:** Labeled with 'PP'.
- Steering Knuckle Bolt:** Labeled with 'QQ'.
- Steering Knuckle Nut:** Labeled with 'RR'.
- Steering Knuckle Washer:** Labeled with 'SS'.
- Steering Knuckle Bolt:** Labeled with 'TT'.
- Steering Knuckle Nut:** Labeled with 'UU'.
- Steering Knuckle Washer:** Labeled with 'VV'.
- Steering Knuckle Bolt:** Labeled with 'WW'.
- Steering Knuckle Nut:** Labeled with 'XX'.
- Steering Knuckle Washer:** Labeled with 'YY'.
- Steering Knuckle Bolt:** Labeled with 'ZZ'.
- Steering Knuckle Nut:** Labeled with 'AA'.
- Steering Knuckle Washer:** Labeled with 'BB'.
- Steering Knuckle Bolt:** Labeled with 'CC'.
- Steering Knuckle Nut:** Labeled with 'DD'.
- Steering Knuckle Washer:** Labeled with 'EE'.
- Steering Knuckle Bolt:** Labeled with 'FF'.
- Steering Knuckle Nut:** Labeled with 'GG'.
- Steering Knuckle Washer:** Labeled with 'HH'.
- Steering Knuckle Bolt:** Labeled with 'II'.
- Steering Knuckle Nut:** Labeled with 'JJ'.
- Steering Knuckle Washer:** Labeled with 'KK'.
- Steering Knuckle Bolt:** Labeled with 'LL'.
- Steering Knuckle Nut:** Labeled with 'MM'.
- Steering Knuckle Washer:** Labeled with 'NN'.
- Steering Knuckle Bolt:** Labeled with 'OO'.
- Steering Knuckle Nut:** Labeled with 'PP'.
- Steering Knuckle Washer:** Labeled with 'QQ'.
- Steering Knuckle Bolt:** Labeled with 'RR'.
- Steering Knuckle Nut:** Labeled with 'SS'.
- Steering Knuckle Washer:** Labeled with 'TT'.
- Steering Knuckle Bolt:** Labeled with 'UU'.
- Steering Knuckle Nut:** Labeled with 'VV'.
- Steering Knuckle Washer:** Labeled with 'WW'.
- Steering Knuckle Bolt:** Labeled with 'XX'.
- Steering Knuckle Nut:** Labeled with 'YY'.
- Steering Knuckle Washer:** Labeled with 'ZZ'.

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STEERING

A—HORN BUTTON RETAINER PLATE—UPPER
B—HORN BUTTON RETAINER PLATE SPRING
C—STEERING WHEEL NUT
D—HORN BUTTON RETAINER PLATE—LOWER
E—COLUMN JACKET
F—COLUMN JACKET CLAMP BOLT, NUT AND LOCK WASHER
G—HOUSING BRACKET ADJUSTING STUD
H—HOUSING BRACKET STUDS
I—SHAFT
J—HOUSING GASKET
K—SHAFT THRUST WASHER
L—HOUSING BRACKET
M—HOUSING BRACKET ECCENTRIC ADJUSTING SLEEVE
N—HOUSING BRACKET ECCENTRIC ADJUSTING SLEEVE LOCK RING
O—HOUSING BRACKET ADJUSTING STUD NUT AND LOCK WASHER
P—ARM
Q—ARM NUT LOCK WASHER
R—ARM NUT
S—SHAFT OIL SEAL RETAINER
T—SHAFT OIL SEAL
U—HOUSING BRACKET BUSHING
V—HOUSING BRACKET STUD NUT AND LOCK WASHER
W—HOUSING BRACKET BUSHING
X—HOUSING BRACKET ECCENTRIC RIVET
Y—WORM THRUST BEARING CUP—UPPER
Z—WORM THRUST BEARING CAGE
AA—GREASE RETAINER TUBE AND PLUG
BB—HOUSING CAP
CC—HOUSING CAP SCREW AND LOCK WASHER
DD—HOUSING CAP SHIMS
EE—WORM THRUST BEARING CUP—LOWER
FF—WORM THRUST BEARING CAGE
GG—STEERING TUBE AND WORM
HH—SHAFT ADJUSTING SCREW
II—SHAFT ADJUSTING SCREW NUT LOCK WASHER
JJ—SHAFT ADJUSTING SCREW NUT
KK—FILLER PLUG
LL—HOUSING
MM—COLUMN JACKET CLAMP
NN—COLUMN JACKET BUSHING
OO—STEERING WHEEL KEY
PP—HORN BUTTON WIRE
QQ—STEERING WHEEL
RR—HORN BUTTON LOCK WIRE
SS—HORN BUTTON CABLE INSULATOR
TT—HORN BUTTON CABLE CONTACT PLUG
UU—HORN BUTTON SPRING
VV—HORN BUTTON

RA PD 53518-B

**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)**

less the wear on the shaft. If the bushing wear exceeds 0.004 inch, replace the housing bracket with fitted bushings.

c. **Remove Steering Worm and Tube Assembly** (fig. 90). Remove the steering wheel key from the top end of the steering gear tube. Loosen the column jacket clamp bolt and remove the jacket. Inspect the column jacket bushing and if excessively worn, drive the bushing out of the jacket and press in a new bushing. Remove four cap screws and the housing cap from the bottom of the housing; avoid damaging the paper shims, if possible, and do not allow the thrust bearing and cup to fall out when the cap is removed. Pull the worm and tube assembly through the lower opening in the housing.

d. **Inspect Worm, Thrust Bearings and Grease Retaining Tube** (fig. 90). Wash the parts in dry-cleaning solvent. Examine worm and thrust bearings and replace worn or damaged parts. Inspect grease retainer tube for leakage at the housing cap. If the tube is loose or leakage is evident, replace the tube.

82. ASSEMBLY OF STEERING GEAR.

a. **Install Worm and Tube Assembly** (fig. 90). Lubricate the upper and lower thrust bearings and place the upper bearing on the tube. Install the worm and tube assembly so that the upper thrust bearing is properly seated in the bearing cup. Install the lower thrust bearing and cap. Place the housing cap into position with the original paper shims and install the attaching cap screws.

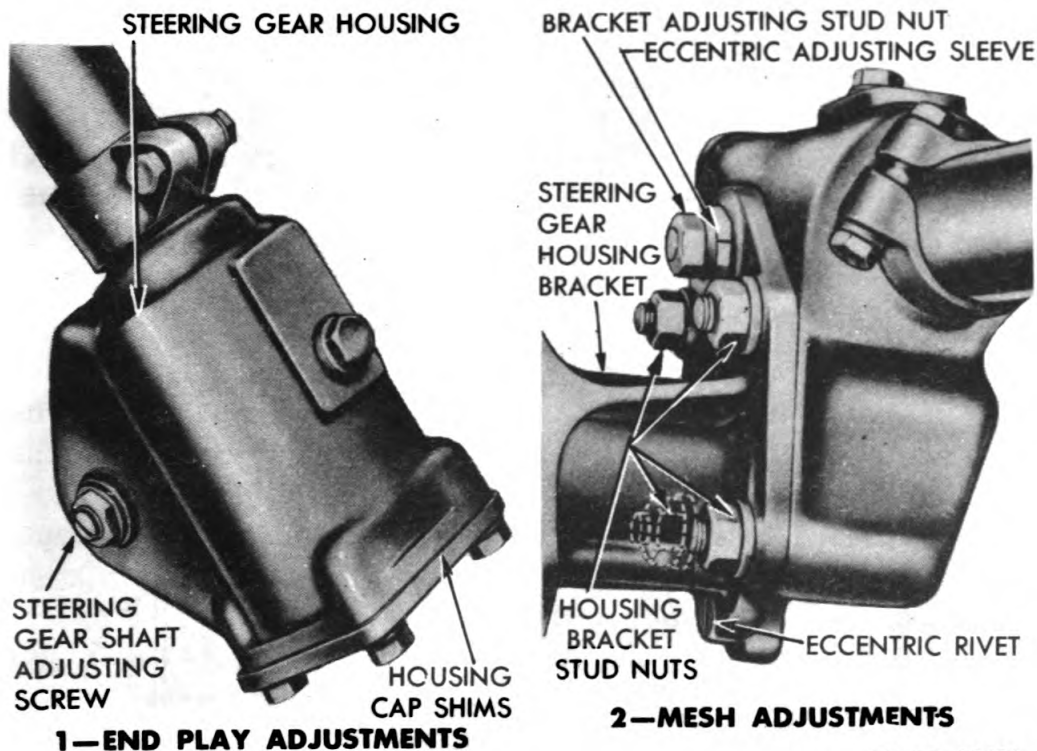
b. **Adjust Worm Thrust Bearings.** Install steering wheel and nut temporarily. Place a socket and an inch-pound torque wrench (41-W-3629-50) on the nut and apply a steady pull to the torque wrench to determine the amount of torque required to turn the tube. If necessary, adjust the preload on the bearings by removing or installing housing cap shims (fig. 91) between the housing and housing cap, until the bearing preload is 12 to 24 inch-pounds when the tube is turned in either direction. Adjustment shims are available in sizes of 0.003 to 0.005 inch.

c. **Install Steering Gear Shaft and Housing Bracket** (fig. 90). Install a new housing bracket gasket in the recess in the steering gear housing. Pry the oil seal retainer and oil seal from the outer end of the housing bracket and install a new seal and retainer. Install a new thrust washer on the steering gear shaft with the chamfered side against the sector. Place the shaft into the housing and install the housing bracket over the shaft. Install the eccentric adjusting sleeve and lock ring on the stud opposite the eccentric rivet. Locate the slot in the

STEERING

adjusting sleeve away from the steering gear shaft. Install all steering housing bracket lock washers and nuts, tighten the adjusting sleeve nut, then the other four nuts.

d. **Adjust End Play out of Steering Gear Shaft (fig. 91).** Install the steering gear arm temporarily. Turn the shaft adjusting screw in until it contacts the end of the shaft sufficiently to remove all shaft end play. End play can be felt by pulling in and out on the steering gear arm. Tighten the adjusting screw lock nut securely when adjustment has been made.

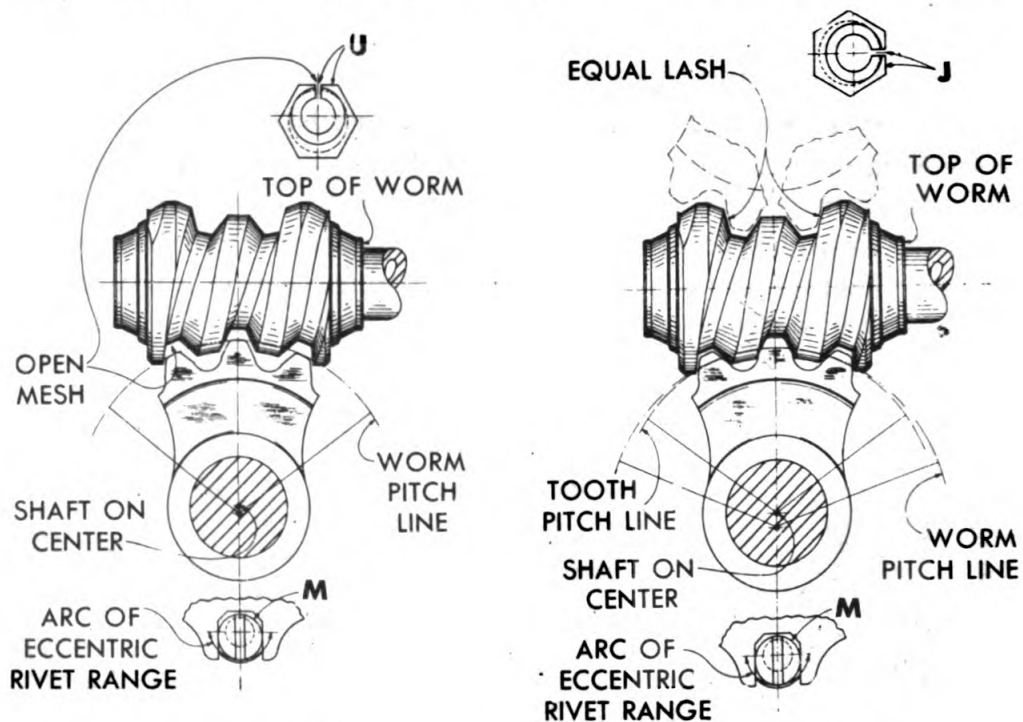


RA PD 53496

Figure 91—Steering Gear Adjustment Points

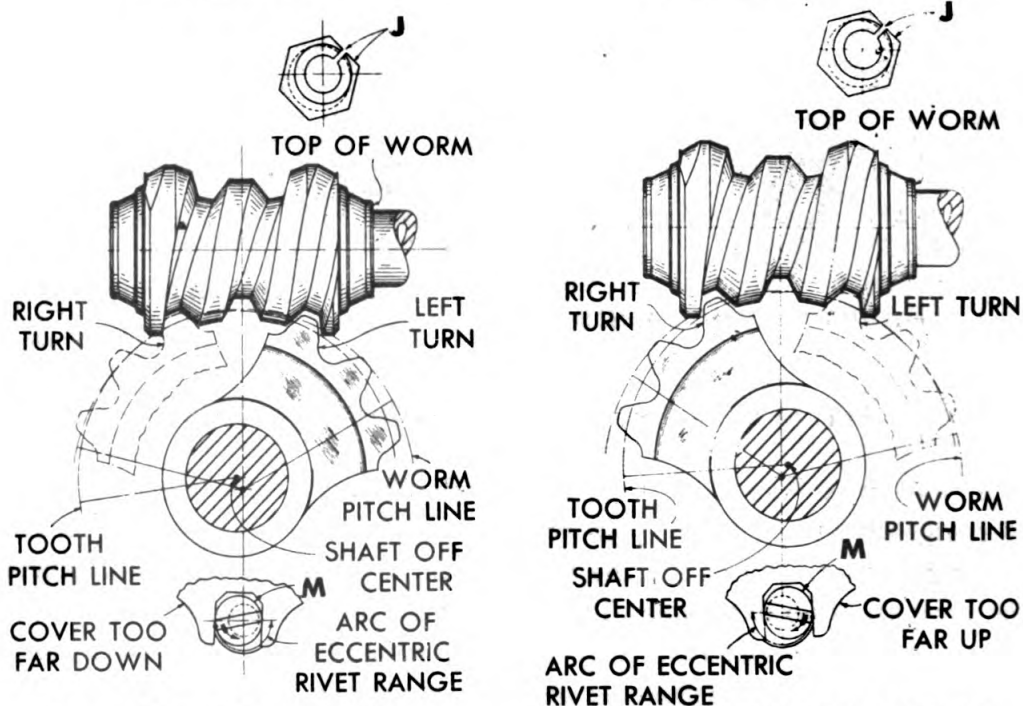
e. **Adjust Worm and Sector Mesh (figs. 91 and 92).** Turn the steering wheel all the way in one direction, then all the way in the other direction and count the number of revolutions the wheel turns between the two extremes. Turn the wheel back one-half the number of revolutions counted and stop with the spoke bearing the trade mark pointing straight up (steering gear upside down in vise). The worm is then in the mid-position. Loosen the housing bracket nuts and turn the eccentric adjusting sleeve (fig. 91 and J, fig. 92) slowly clockwise while moving the steering wheel back and forth through the mid-position. When a bind becomes noticeable, place a torque wrench (41-W-3629-50) on the steering wheel nut and adjust the adjusting sleeve

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1—OPEN MESH

2—PROPER MESH



TURN COUNTERCLOCKWISE
TO CORRECT

TURN CLOCKWISE TO CORRECT

3—EXCESSIVE LASH—LEFT TURN

4—EXCESSIVE LASH—RIGHT TURN

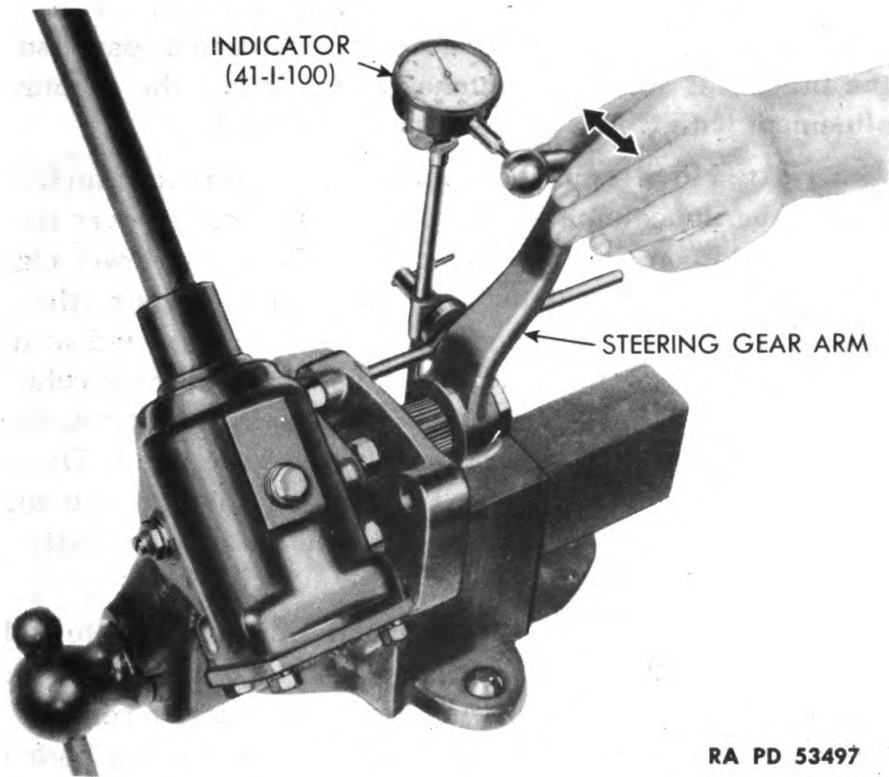
RA PD 53498

Figure 92—Steering Gear Adjustment Diagram

STEERING

until the preload is increased 12 inch-pounds over that of the bearing preload (par. 82 b) when the steering wheel is moved through the mid-position. Tighten the adjusting sleeve lock nut securely when mesh adjustment has been made.

f. **Check Eccentric Rivet Adjustment (fig. 93).** Place the steering wheel in mid-position. Turn the steering wheel $\frac{1}{2}$ turn in either direction. Mount a dial gage on the steering housing bracket with the plunger against the ball of the steering arm. Move the steering arm



RA PD 53497

Figure 93—Checking Eccentric Rivet Adjustment

back and forth and read the play on the dial gage (41-I-100). Turn the steering wheel $\frac{1}{2}$ turn beyond mid-position in the opposite direction and check the play in the same manner. If the difference in the two readings is greater than 0.004 inch, adjust the eccentric rivet (M, fig. 92).

g. **Install Column Jacket.** Remove the steering wheel and steering gear arm. Slide the column jacket over the steering tube, being careful not to damage the jacket bushing. Do not apply oil or other lubricant to the jacket bushing. Enter the lower end of the jacket into the clamp at the steering gear housing and tighten the clamp bolt.

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83. INSTALLATION OF STEERING GEAR ASSEMBLY.

a. **Attach Steering Gear to Frame.** Lift the assembly and pass it up between the frame front cross member and the front axle into position. Install the cap screws with plain washers and lock washers which attach the steering gear housing bracket to the frame but do not tighten. Move the steering post into its installed position, then tighten the steering gear housing bracket to frame cap screws. If the steering post moves sidewise when the cap screws are tightened, shift the bracket clamp on the instrument panel to meet the column by elongating the holes in the clamp and instrument panel so that when the bracket is securely tightened to the frame the column will be in alinement with clamp at the instrument panel.

b. **Attach Steering Column to Instrument Panel.** Install the upper steering column to instrument panel clamp over the rubber or felt insulator on the steering column. Place the lower clamp on the under side of the insulator and attach the clamps to the instrument panel with the two bolts, toothed lock washers, ground strap and nuts. Place one end of the instrument panel to steering column ground strap under the head of the left clamp bolt so that two toothed lock washers are installed, one on each side of the strap. Do not tighten. Connect the ground strap at the steering column with toothed lock washer between the bracket on the column and the under side of the strap.

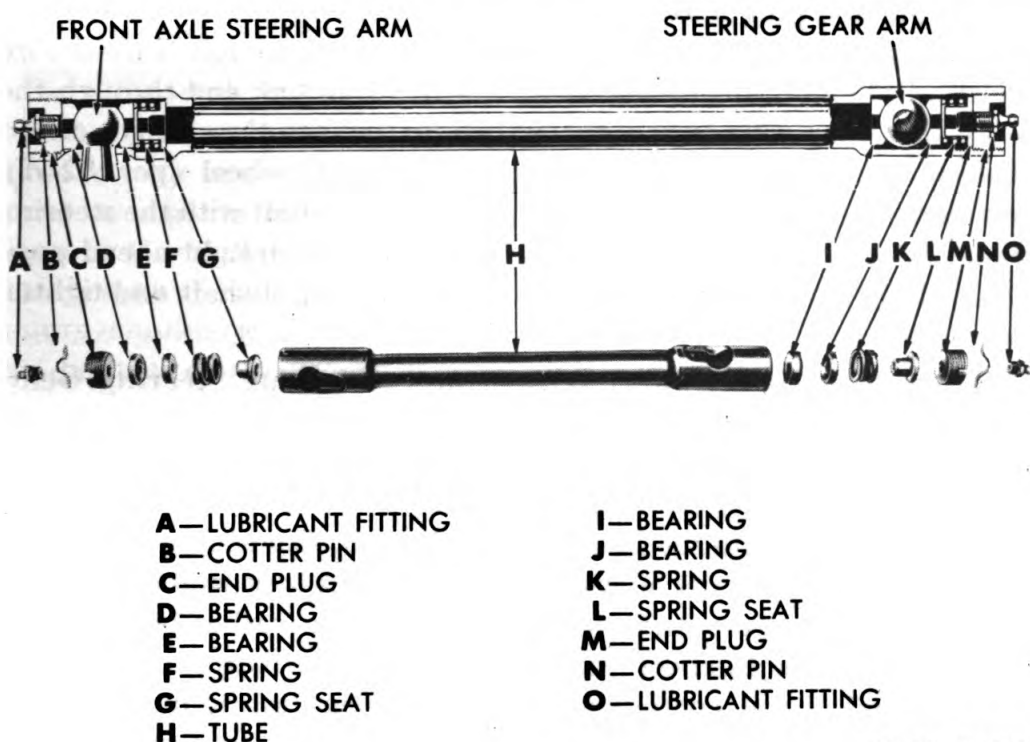
c. **Install Steering Wheel, Horn Wire and Button.** Install the steering wheel key in the steering gear tube and install the steering wheel on the tube. Install the horn button lower retainer plate and the steering wheel nut. Tighten the nut. Place the horn button retainer plate spring on the lower retainer plate. Insert a piece of soft iron wire into the lower end of the steering gear grease retainer tube and push it through the entire length of the steering gear tube. Allow sufficient wire to extend out of each end so that the horn wire can be attached to the upper end and enough on the lower end to pull the wire back through the tube. Attach the lower end of the horn wire to the upper end of the wire in the tube and pull the horn button wire through the steering gear tube. Press down on the horn button and at the same time turn it counterclockwise to fasten it in place in the steering wheel. Insert the lower end of the horn wire into the connector.

d. **Adjust Steering Column Jacket to Steering Wheel.** Loosen the jacket clamp bolt and locate the jacket so the top end will just enter the bottom of the steering wheel recess but not contact the

STEERING

steering wheel. Locate the steering column jacket clamp as near the steering gear housing as possible and tighten the clamp bolt with lock washer. Tighten the steering post bracket at the instrument panel.

e. **Install Master Cylinder.** Hold the master cylinder in position and start the nut of the brake tube into the tee connection. Start the mounting screw with lock washer on the left side of the master cylinder, the mounting screw with lock washer on the right side of master cylinder together with the clip that holds the fuel tube, then the lower screw and lock washer. Install the clevis pin and cotter pin to connect the brake push rod assembly to the brake pedal. Tighten the three



RA PD 53509

Figure 94—Drag Link

master cylinder mounting screws and tighten the brake tube nut at the tee connection. Move the fuel tube back on the master cylinder and bend over the clip.

f. **Bleed Brake System** (par. 77 c).

g. **Install Engine Dust Pan.** Place the master cylinder line tee in position on the frame side member and install the bolt through the frame tee bracket and frame side member. Place the dust pan in position and insert battery box drain hose in hole provided for it, on vehicles with six-volt electrical systems. Install the internal-external toothed lock washers on the two dust pan cap screws and tighten the screws.

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Tighten the frame tee bracket bolt. Place torque arrester in position on the frame side member and attach it with the bolts, internal-external toothed lock washers and nuts. Attach the chassis wiring cable with the wiring clip to the dust pan. Install the screw that attaches the dust pan to the frame front cross member. Insert the screw by reaching down between the radiator and engine. Place the wiring and fuel line clip and lock washer on the screw and tighten.

h. Connect Drag Link to Steering Gear Arm and Install the Arm on the Steering Gear Shaft. Place drag link end over ball on the steering arm and install the metal dust cover. Install the bearing, spring and end plug in order (fig. 94). Install end plug and screw the plug in tight, then back it off to the nearest lock wire hole. Install wire lock and lubricant fitting and lubricate the drag link end through the lubricant fitting. Turn the front wheels by hand to the straight ahead position. Locate the mid-position of the steering wheel (par. 82 d). Install the steering gear arm on the steering gear shaft with the steering wheel in mid-position and the front wheel in the straight ahead position. Install standard lock washer and nut on end of shaft and tighten the nut securely.

i. Install Coil, Connect Battery and Lubricate Steering Gear. Place coil on mounting bracket studs and install the nuts with wire clip and standard lock washer under nut on outer stud and standard lock washer under nut on the inner stud. Push the cable which runs to the distributor into the lower end of the coil. Connect ground strap to post at upper end of coil, placing one toothed lock washer between the coil and the strap and another toothed lock washer between the strap and the nut. Connect primary wire from distributor to inner post at lower end of coil, connect wire from filter on dash to outer post at lower end of coil. Place the wire in clip on coil mounting stud and close the clip. Connect cable to the battery and fill steering gear with lubricant.

j. Install Floor Plate (par. 23 g).

k. Install Floor Mat (Ambulance only) (par. 23 i).

CHAPTER 3

CHASSIS (Cont'd)

Section V

FRAME

	Paragraph
Frame alinement	84
Frame assembly replacement.....	85

84. FRAME ALINEMENT.

a. General. Improper frame alinement places undue strain on various parts of the entire vehicle, affects wheel alinement and causes tires to wear unnecessarily. Figure 95 shows various dimensions to be used as a guide in checking frame alinement. This illustration also shows a few of the various diagonal measurements that may be taken to check the squareness of the frame. Diagonal measurements will quickly determine which section of the frame is bent and where force should be applied to restore correct alinement.

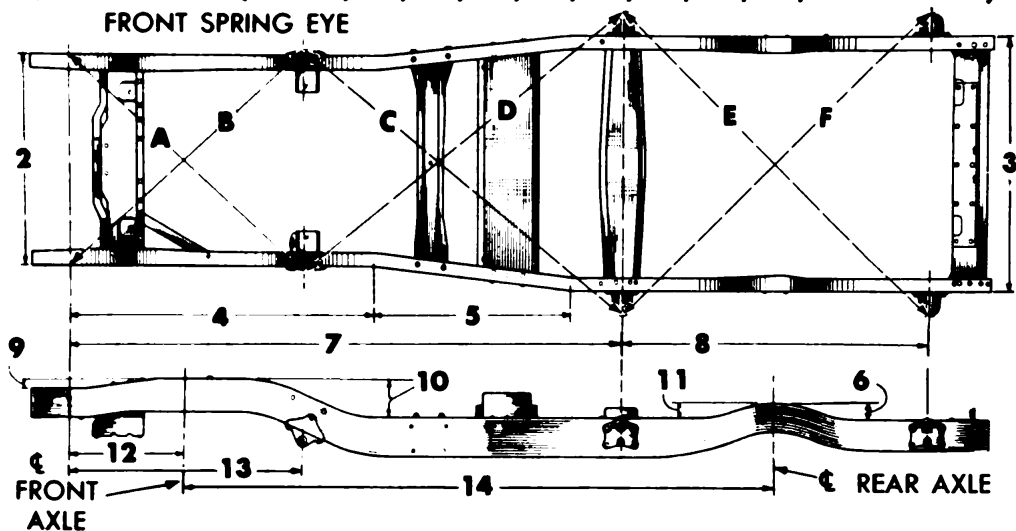
b. Checking Frame Alinement. The frame may be checked for alinement by taking diagonal measurements, without removing the body from the chassis, as follows:

(1) **ATTACH PLUMB-BOB.** Place the truck on a level floor with all tires properly inflated. Suspend a plumb-bob from various corresponding points on the frame, such as indicated by the diagonal lines A-F in figure 95. Suspend the plumb-bob slightly above the floor. When the plumb-bob comes to rest, mark the floor directly underneath it. The marks made on the floor will represent various points of the frame to be checked diagonally. Move the truck away so that the distance between the marks on the floor can be measured.

(2) **MEASURE DIAGONALS.** Measure the distance between the points connected by line A (fig. 95). This distance should agree within $\frac{1}{4}$ inch with the distance between the points connected by line B. The distance between the points connected by line C should agree within $\frac{1}{4}$ inch with the distance between points connected by line D. The distances E and F should also be checked in this same manner. The diagonals shown in figure 95 represent only a few that may be checked. Many other diagonals may be measured in the same way. **CAUTION:** *Exercise care to see that any two diagonals compared represent exactly corresponding points on each side of the frame.*

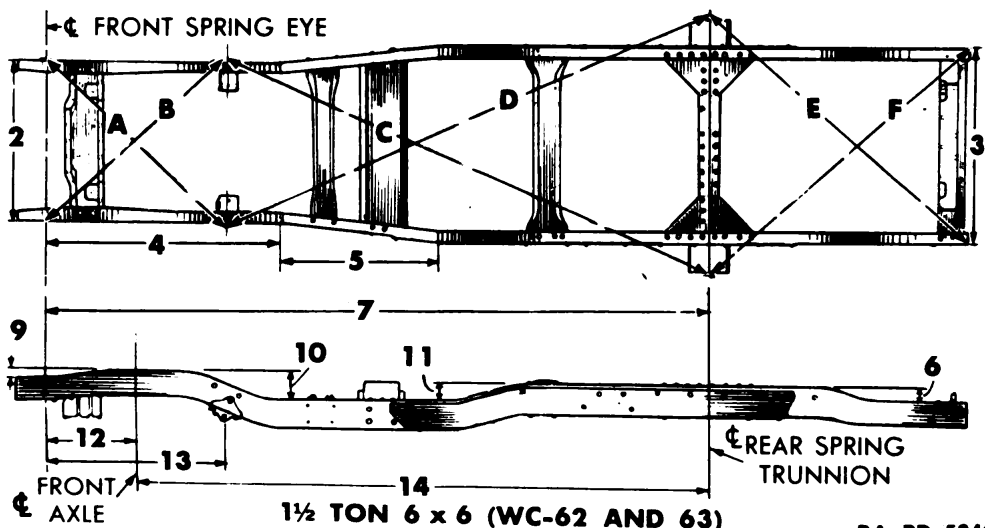
**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND $1\frac{1}{2}$ TON 6 x 6 (DODGE)**

$\frac{3}{4}$ TON 4 x 4 (WC-51, 52, 53, 54, 55, 56, 57, 58, 59, 60 AND 61)
FRONT SPRING EYE



KEY	WC-51, 52, 55, 56, 57 AND 58	WC-53 AND WC-53 SPECIAL	WC-54, 59, 60 AND 61	WC-62 AND 63
2	$33\frac{1}{8}$ -IN.	$33\frac{1}{8}$ -IN.	$33\frac{1}{8}$ -IN.	$33\frac{3}{32}$ -IN.
3	$40\frac{1}{8}$ -IN.	$40\frac{1}{8}$ -IN.	$40\frac{1}{8}$ -IN.	$40\frac{3}{16}$ -IN.
4	$50\frac{3}{16}$ -IN.	$50\frac{3}{16}$ -IN.	$50\frac{3}{16}$ -IN.	$50\frac{3}{16}$ -IN.
5	$33\frac{1}{2}$ -IN.	$33\frac{1}{2}$ -IN.	$33\frac{1}{2}$ -IN.	$34\frac{1}{32}$ -IN.
6	$2\frac{1}{16}$ -IN.	$2\frac{1}{16}$ -IN.	$2\frac{1}{16}$ -IN.	$2\frac{1}{16}$ -IN.
7	$90\frac{13}{16}$ -IN.	$106\frac{13}{16}$ -IN.	$113\frac{13}{16}$ -IN.	$143\frac{49}{64}$ -IN.
8	$50\frac{27}{32}$ -IN.	$50\frac{27}{32}$ -IN.	$50\frac{27}{32}$ -IN.	$2\frac{1}{4}$ -IN.
9	$1\frac{1}{16}$ -IN.	$1\frac{1}{16}$ -IN.	$1\frac{1}{16}$ -IN.	$1\frac{1}{16}$ -IN.
10	6 -IN.	6 -IN.	6 -IN.	6 -IN.
11	$2\frac{1}{16}$ -IN.	$2\frac{1}{16}$ -IN.	$2\frac{1}{16}$ -IN.	$3\frac{47}{64}$ -IN.
12	$18\frac{21}{32}$ -IN.	$18\frac{21}{32}$ -IN.	$18\frac{21}{32}$ -IN.	$18\frac{21}{32}$ -IN.
13	$38\frac{13}{32}$ -IN.	$38\frac{13}{32}$ -IN.	$38\frac{13}{32}$ -IN.	$38\frac{13}{32}$ -IN.
14	98-IN. (W.B.)	114-IN. (W.B.)	121-IN. (W.B.)	125-IN. (W.B.)

A. B. C. D. E AND F—DIAGONAL MEASUREMENTS



$1\frac{1}{2}$ TON 6 x 6 (WC-62 AND 63)

RA PD 53463

Figure 95—Frame Alinement Diagram

FRAME

c. Frame Repairs.

(1) **FRAME STRAIGHTENING.** In the production of truck frames, no heat is employed in the shaping and forming of the side rails, therefore, all straightening operations should be performed cold whenever practical. When a frame side rail or cross member is badly damaged, the use of heat may be necessary as a last resort. When it is considered practical to employ heat, maintain the temperature of the area to be straightened at a cherry red throughout the entire straightening operation. As an oxy-acetylene torch is generally used for heating, use a "neutral" flame and play it over the entire area to be heated until the metal has reached a uniform cherry red. Never heat the metal beyond a cherry red as it will result in serious weakening of the steel. It is good practice to frequently check the temperature of the heated metal with a dry pine stick, while it is being worked, to maintain it at the proper state of ductility, and avoid burning. Touching a dry pine stick to metal that has been heated to a cherry red will cause stick to glow and to char, but not to ignite. Protect the heated area of the frame from drafts to prevent sudden cooling of the metal.

(2) **FRAME WELDING.** When a major welding operation has been performed, apply a reinforcement to straighten the repaired section. The thickness of the reinforcement material should at least equal the thickness of the frame section. A fish plate is generally satisfactory, but in extreme cases such as the repair of a side rail, install a channel reinforcement. When installing a channel reinforcement, weld only the edges of the channel to the frame flanges, leaving the ends free to avoid localization of the stresses brought about by the straightening and welding. In the case of major frame repair work the installation of component replacement parts will simplify the job and assure more accurate repairs.

85. FRAME ASSEMBLY REPLACEMENT.

a. **General.** Due to the various types of bodies and equipment used on the trucks covered by this manual, no detailed procedure for frame replacement is furnished.

b. Adjustments after Frame Replacement.

(1) **BLEED THE BRAKE SYSTEM** (par. 77 c).

(2) **CHECK FRONT WHEEL ALINEMENT** (par. 42).

(3) **CHECK BRAKE PEDAL FREE PLAY** (par. 77 b).

(4) **CLUTCH PEDAL FREE PLAY.** Check clutch pedal free play and if the free play is not approximately $1\frac{1}{8}$ inch at the pedal pad, disconnect the clutch operating rod from the clutch operating shaft lever.

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Loosen the lock nut on the stop screw which is screwed into a pad on the pedal and contacts the clutch pedal bracket. Adjust the stop screw so that the pedal (when in the released position) has $\frac{1}{2}$ -inch clearance with the floor plate and tighten the lock nut. Loosen the lock nut on the clutch operating rod. Push the clutch shaft lever forward to take up its free movement and adjust the yoke on the rod so that the pin will slide through the operating shaft lever when the clutch pedal pad is held down $1\frac{1}{8}$ inch from its released position. Install the pin and cotter pin and tighten the yoke lock nut.

CHAPTER 3

CHASSIS (Cont'd)

Section VI

SPRINGS AND SHOCK ABSORBERS

	Paragraph
Description of construction.....	86
Front spring assembly.....	87
Rear spring assembly.....	88
Spring trunnion bearings (1½ ton, 6 x 6 truck).....	89
Shock absorbers	90

86. DESCRIPTION OF CONSTRUCTION.

a. **Springs (¾ Ton, 4 x 4 Truck)** (figs. 96 and 97). The front and rear springs are bushed at each end of the main leaf. The leaves are held in place by rebound clips and a center bolt. The front spring front shackles are adjustable.

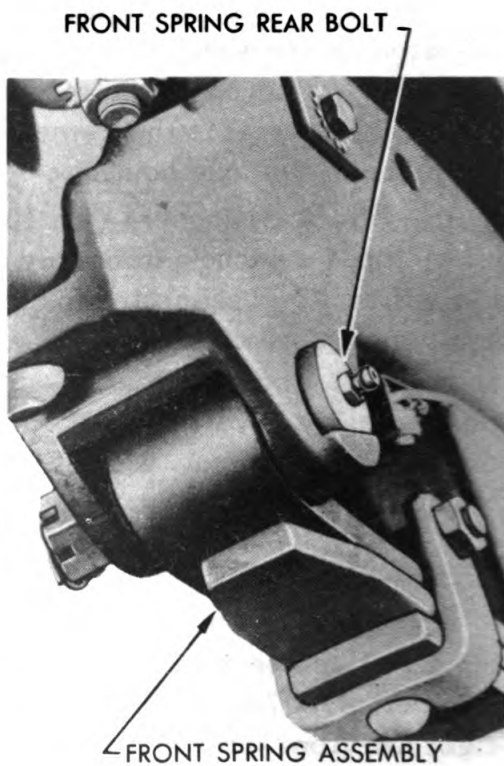
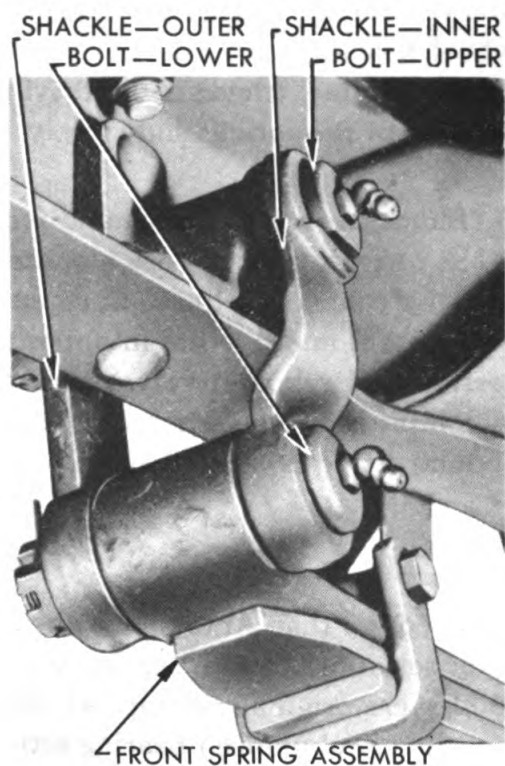
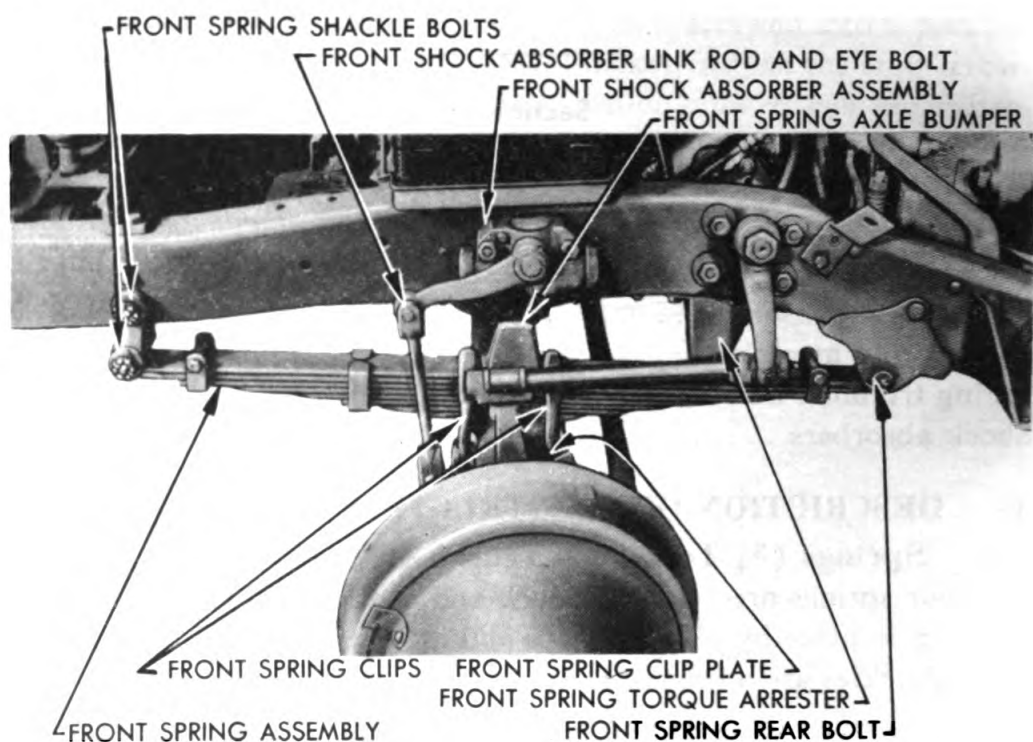
b. **Springs (1½ Ton, 6 x 6 Truck)** (figs. 96 and 97). The front springs are of the same construction as used on the ¾ ton, 4 x 4 truck. The rear springs are mounted on two tapered roller bearings which are adjusted in the same manner as wheel bearings. Torque links, with ball joints attached to the rear axles and frame, transmit the driving and braking forces to the frame. The ends of the springs slide freely in brackets on the axle housings.

c. **Shock Absorbers** (fig. 100). Shock absorbers (front and rear on ¾ ton, 4 x 4 truck, front only on 1½ ton, 6 x 6 truck) are mounted to the frame and connected to the axles by connecting links. Each unit has two pistons which are connected together and operate in opposite ends of the same cylinder. Compression and rebound valves control the passage of hydraulic fluid. The compression valve is mounted in the end of the piston, while the rebound valve is located in the side of the shock absorber body.

87. FRONT SPRING ASSEMBLY.

a. **Types of Springs Used.** Trucks (other than Ambulance) bearing serial number 81623727 or a lower serial number, excepting serial numbers 81607816 through 81619000, were originally equipped with eight leaf front springs. Trucks (other than Ambulance) bearing serial number 81623728 or a higher serial number and trucks with serial numbers 81607816 through 81689000 were originally equipped with nine leaf front springs. The spring clips used with the eight leaf springs

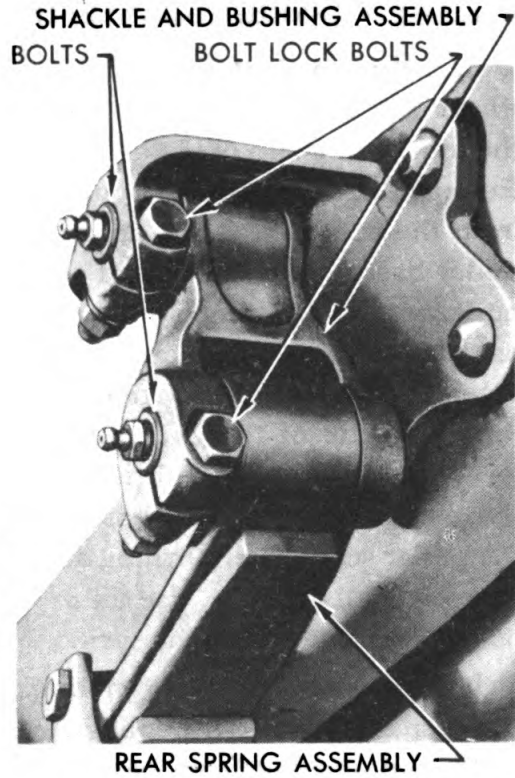
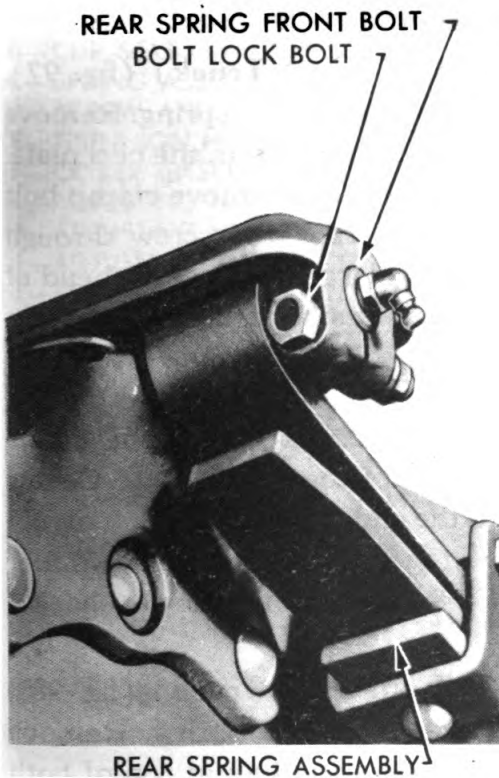
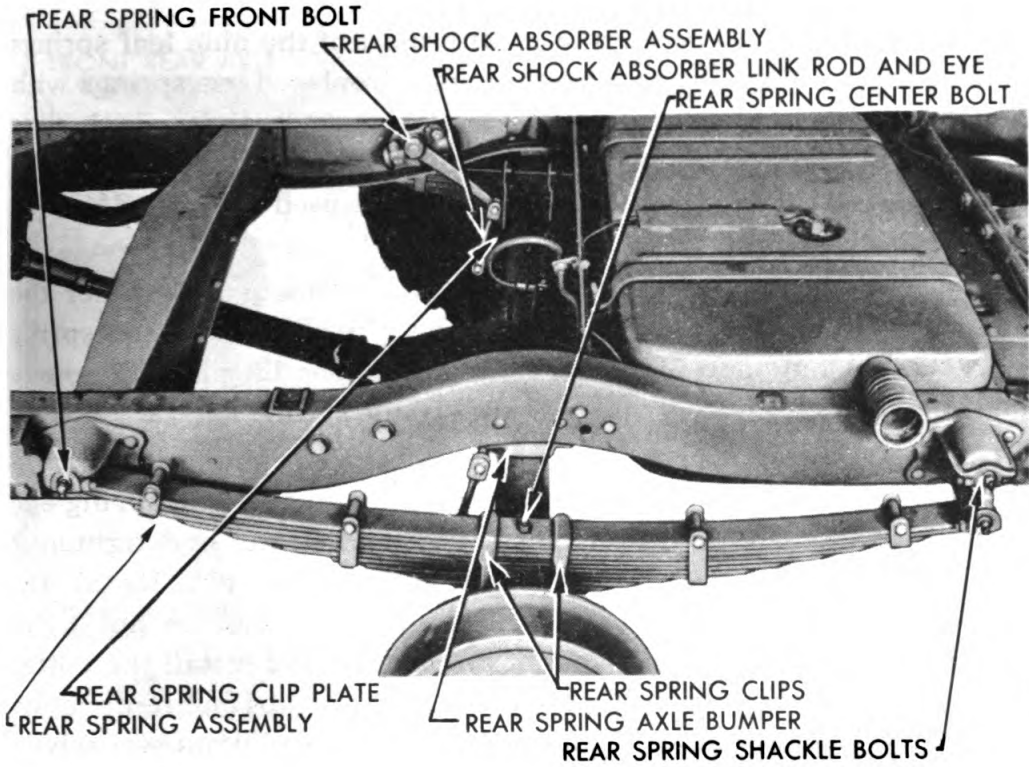
**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
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RA PD 53521

Figure 96—Front Spring and Related Parts

SPRINGS AND SHOCK ABSORBERS



RA PD 53520

Figure 97—Rear Spring and Related Parts (½ Ton, 4 x 4 Truck)

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are $8\frac{5}{8}$ inches long. The clips used with most of the nine leaf springs are $8\frac{13}{16}$ inches long. When a front spring is replaced use springs with the same number of leaves on both sides of the truck. If $8\frac{13}{16}$ -inch clips are not available, when installing a nine-leaf spring, use thin star lock washers instead of the heavy duty lock washers used with the $8\frac{5}{8}$ -inch clips.

b. Removal of Front Spring (fig. 96). Place a jack under the bumper or frame and raise the load off the spring. Remove the spring clip (U-bolt) nuts and raise the clips out of the clip plate. Remove the spring bolts from front and rear ends of the spring.

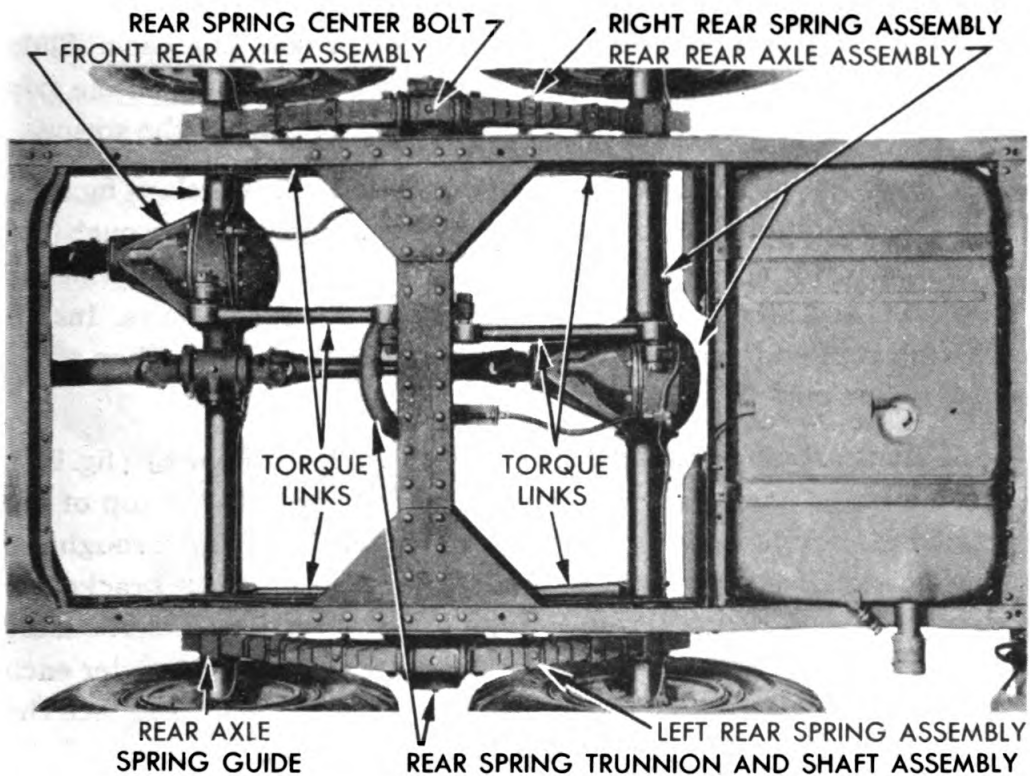
c. Installation of Front Spring (fig. 96). Place the spring in position and insert the spring rear bolt through the bracket and spring eye from the inside of the bracket. Install the slotted nut and tighten it tight, then back it off one slot and install the cotter pin. Install the shackle bolt through the shackle and spring eye. Tighten nut tight, using a 12-inch wrench, then back it off one slot and install the cotter pin. Lubricate the spring bolts. Install the spring clips and remove the jack from under the truck. Then tighten the spring clip nut securely.

88. REAR SPRING ASSEMBLY.

a. Removal of Rear Spring ($\frac{3}{4}$ Ton, 4 x 4 Truck) (fig. 97). Place jack under rear of frame and raise the load off the spring. Remove the four spring clip (U-bolt) nuts and raise the clips from the clip plate. Remove lubricant fitting from spring front bolt and remove clamp bolt from the spring bracket. Insert puller (41-P-2951-70) screw through puller barrel from the closed end and screw large nut back to head of puller screw. On the command and on the left side of carryall models, use washers $\frac{1}{2}$ inch thick between puller barrel and spring bracket to extend puller out past edge of body. Remove battery to get to bolt on the right side of the carryall. Screw the threaded end of the puller screw tightly into the lubricant fitting hole of the spring bolt. Center the open end of the puller barrel around the end of the spring bolt. Hold the puller screw from turning and screw the large nut against the puller barrel to pull the bolt. Use the same procedure to pull the lower shackle bolt at the rear end of the spring.

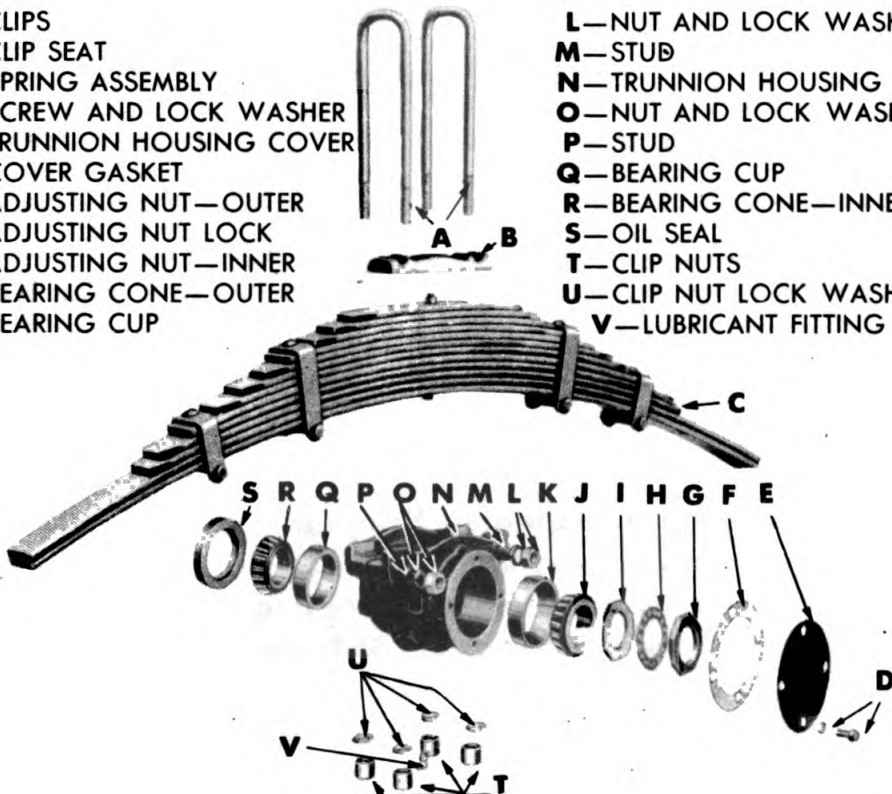
b. Removal of Rear Spring (1½ Ton, 6 x 6 Truck) (fig. 98). Raise chassis frame just enough to take the load off the spring. Remove cotter pin and nut from ball stud of spring torque link at top of both rear axle housings. Drive the tapered studs out of the brackets with brass drift and hammer. Remove the spring clips (U-bolts) and loosen the two stud nuts which clamp the spring in the trunnion housing. Tip

SPRINGS AND SHOCK ABSORBERS



- A—CLIPS
- B—CLIP SEAT
- C—SPRING ASSEMBLY
- D—SCREW AND LOCK WASHER
- E—TRUNNION HOUSING COVER
- F—COVER GASKET
- G—ADJUSTING NUT—OUTER
- H—ADJUSTING NUT LOCK
- I—ADJUSTING NUT—INNER
- J—BEARING CONE—OUTER
- K—BEARING CUP

- L—NUT AND LOCK WASHER
- M—STUD
- N—TRUNNION HOUSING
- O—NUT AND LOCK WASHER
- P—STUD
- Q—BEARING CUP
- R—BEARING CONE—INNER
- S—OIL SEAL
- T—CLIP NUTS
- U—CLIP NUT LOCK WASHERS
- V—LUBRICANT FITTING



RA PD 53519

Figure 98—Rear Spring and Related Parts (1 1/2 Ton, 6 x 6 Truck)

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the top of the front rear axle forward and top of rear axle back. Slide the spring forward so that the rear end will clear the bracket on the axle housing, then pull the spring back to clear the front end of the spring.

c. Installation of Rear Spring ($\frac{3}{4}$ Ton, 4 x 4 Truck) (fig. 97). Place the spring in position and insert the spring bolts through the brackets and spring eyes from the outside of the brackets. Install the clamp bolts and lubricant fittings and lubricate the spring bolts. Install the spring clips and remove the jack from under the frame. Then tighten the spring clip (U-bolt) nuts securely.

d. Installation of Rear Spring (1½ Ton, 6 x 6 Truck) (fig. 98). With the top of the front rear axle tipped forward and the top of the rear rear axle tipped back, slide the front end of the spring through the bracket on the front rear axle, then pull it back through the bracket on the rear rear axle. Enter the spring center bolt in the trunnion housing bracket. Install the spring clips with standard lock washers under each nut and tighten the clamp stud nuts in the trunnion bracket. Place the tapered ball stud of the torque links into the brackets and install the nuts and cotter pins. Remove jack from under truck and tighten the spring clip nuts securely.

89. SPRING TRUNNION BEARINGS (1½ Ton, 6 x 6 Truck).

a. Removal of Trunnion Bearings (fig. 98). Place a jack under the frame and raise the load off the trunnion bearings. Remove the spring clips (U-bolts) and loosen the two clamp stud nuts. Remove the cap screws which hold the housing cover to the housing. Remove the bearing adjusting nuts and pull the housing off the trunnion shaft. Drift the inner bearing cone and oil seal from the housing, then drift the bearing cups from the housing.

b. Installation of Trunnion Bearings and Oil Seal (fig. 98). Drift bearing cups into housing with the thick edge first. Pack the inner bearing cone with chassis grease and place it in the bearing cup. Drift the bearing oil seal into the housing. Slide the housing over the trunnion shaft. Pack the outer bearing with grease and install the bearing. Install the bearing inner adjusting nut and tighten it securely. Install adjusting nut lock and outer adjusting nut. Fill the trunnion housing with lubricant through the lubricant fitting and install the housing cover. Install the spring clips and tighten the two clamp stud nuts. Remove jack from under truck and tighten the spring clip nuts securely.

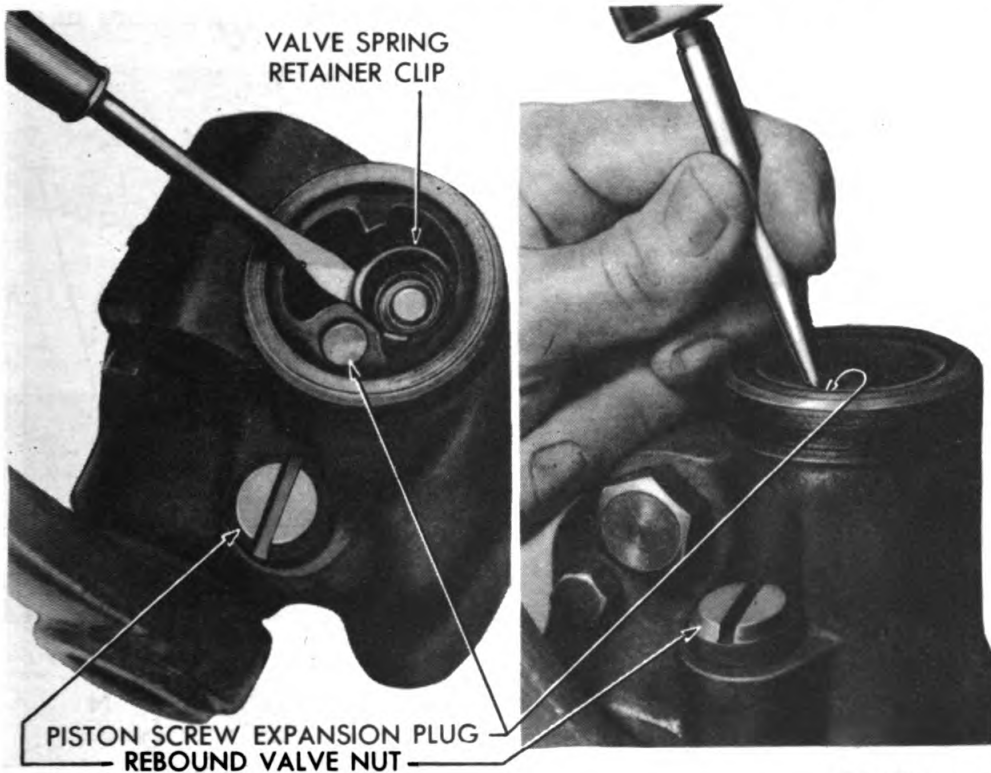
SPRINGS AND SHOCK ABSORBERS

90. SHOCK ABSORBERS.

a. **Removal of Shock Absorber Assembly.** Remove pin which connects the link to the shock absorber arm. Remove bolts which hold shock absorber to frame and lift off assembly.

b. **Disassembly and Inspection of Shock Absorber.**

(1) **DISASSEMBLE SHOCK ABSORBER.** Clean the exterior of the shock absorber thoroughly and bolt the assembly to a plate. Do not



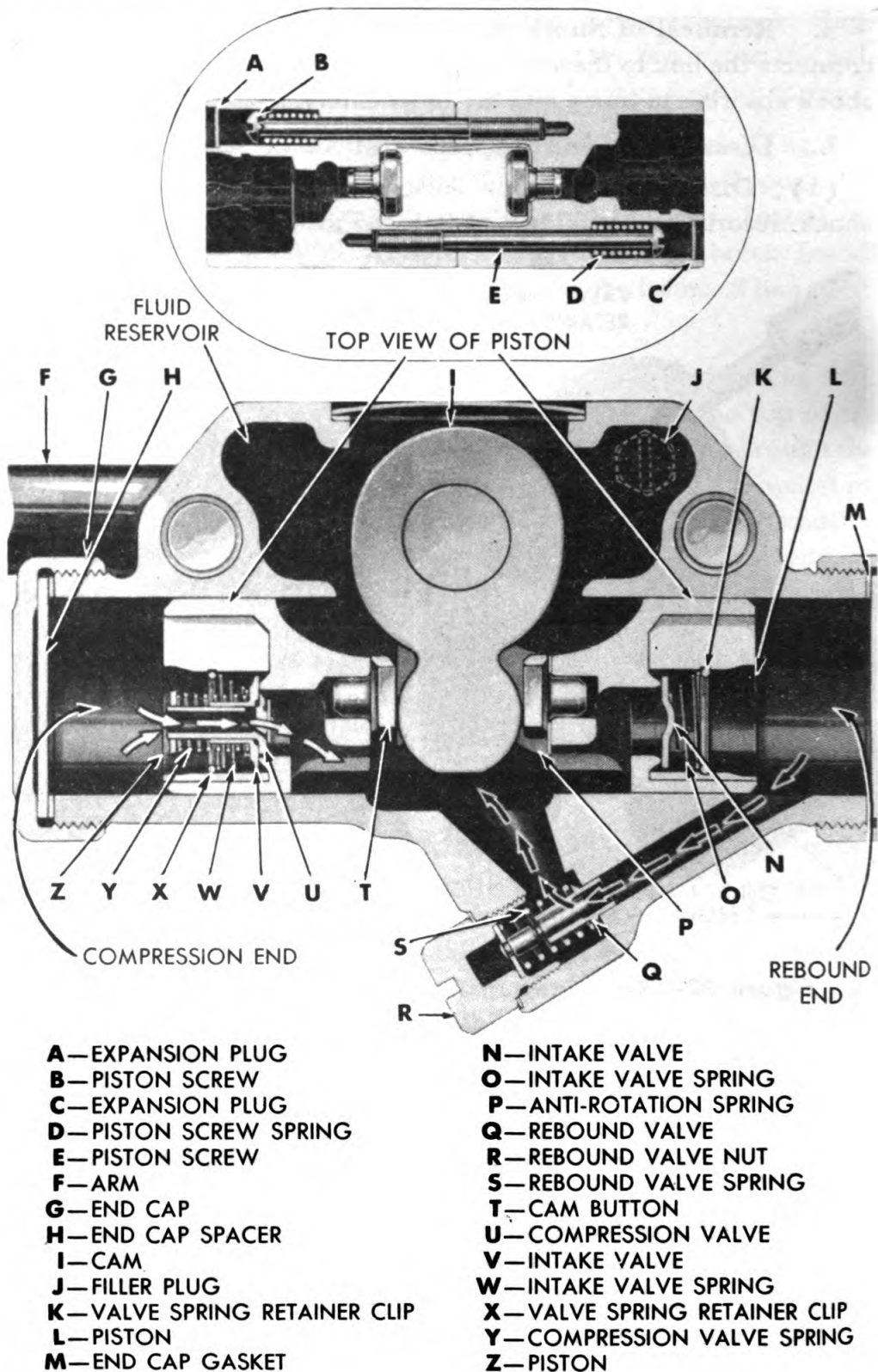
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Figure 99—Removing Piston Screw Plug and Valve Spring Retainer Clip

clamp the shock absorber in a vise in a manner that will distort the cylinder. Remove the end caps (G, fig. 100). Remove the piston valve spring retainer clips (fig. 99) and lift the valves out. Remove the rebound valve nut (R, fig. 100) and then remove the rebound valve. Remove the piston screw expansion plug in the end of each piston by piercing them with a sharp tool and lifting them out (fig. 99). Remove the piston screws and pull the pistons out of the cylinder.

(2) **INSPECT PARTS** (fig. 100). Wash all shock absorber parts in dry-cleaning solvent, and inspect for wear or defects. Look for broken internal parts and a broken or cracked shock absorber body. Blow out the valve orifices with compressed air, making sure the valves are clean.

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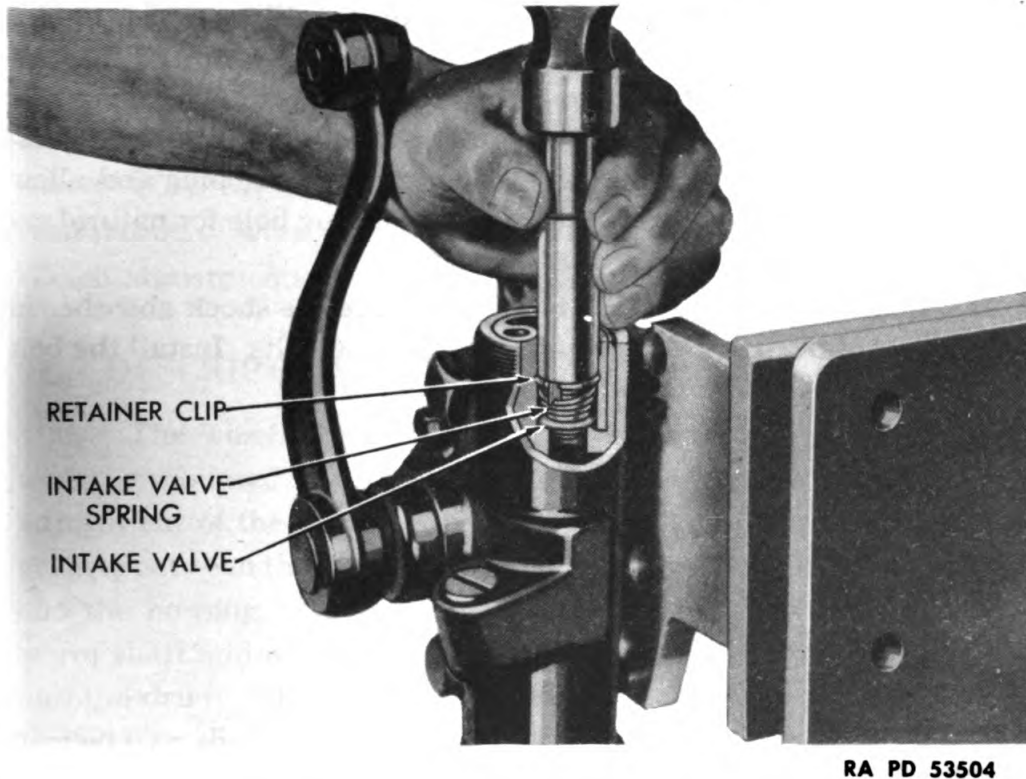
Figure 100—Shock Absorber Cross Section

SPRINGS AND SHOCK ABSORBERS

Check the camshaft for wear in the housing by moving the shock absorber arm sideways. If the shaft is galled or worn, replace the complete shock absorber unit. The shock absorber body, arm, packing gland, camshaft, and cam are replaceable only by the use of special fixtures and presses which are required to assemble and disassemble these parts.

c. Assembly of Shock Absorber.

(1) **GENERAL.** Keep all parts, especially the fluid, clean, since the slightest particles of foreign material may result in undue wear or may lodge in the valve parts and cause loss of resistance.



RA PD 53504

Figure 101—Installing Valve Spring

(2) **INSTALL PISTONS, PISTON SPRINGS AND SCREWS.** Assemble the pistons in the cylinder with the cam clearance at the top and also with the high arch of the antirotation spring up (P, fig. 100). In order to assemble pistons in cylinders, it is necessary to file a $\frac{1}{16}$ -inch chamfer on compression end piston to allow the antirotation spring to enter the piston. Install the piston springs (D, fig. 100) and screws (B, fig. 100) turning them down tight and then backing them off about 1 to $1\frac{1}{2}$ turns to prevent binding between the cam and the cam buttons.

(3) **INSTALL EXPANSION PLUGS AND VALVES.** Install new expansion plugs over the piston screws by expanding them in their seats.

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Place the plug (A, fig. 100) in position with the crown of the plug on the outside, and then flatten the plug out with a drift and hammer. Install the piston valves and the valve spring retainer clips, as shown in figure 101. Make sure the compression valve is placed in the compression end of the piston. Install the rebound valve and the valve nut, using new gaskets.

(4) **INSTALL CAPS AND FILL SHOCK ABSORBER.** With one end of the cylinder up, place a small amount of grease between the end cap and the steel spacer, install a new gasket and tighten the cap on the cylinder end. Turn the other end of the absorber up and fill to capacity with shock absorber fluid. While filling absorber, move the arm end through complete strokes to expel air from the cylinder. Install the other end cap and rotate the fixture until the shock absorber is in the same position as when mounted on the truck. Remove the filler plug and allow the fluid to drain down to the level of the filler plug hole for natural expansion of the fluid.

d. Installation of Shock Absorber. Place the shock absorber in the channel of the frame and install the attaching bolts. Install the bolt which connects the link to the shock absorber arm.

CHAPTER 3

CHASSIS (Cont'd)

Section VII

WINCH

	Paragraph
Description of construction	91
Removal of winch assembly	92
Disassembly and inspection of winch parts	93
Assembly of winch	94
Installation of winch assembly	95
Winch adjustments	96

91. DESCRIPTION OF CONSTRUCTION.

a. The winch is of the worm driven, drum type (fig. 102). The worm is mounted on two tapered roller bearings. The end thrust or adjustment of the worm bearings is controlled by the thickness of the gaskets between the bearing retainer at the brake end of the worm shaft and the housing. A safety brake is mounted on the front end of the worm shaft and a drum brake is mounted between the worm housing and the drum. The drum clutch slides on the drum shaft and is controlled by a short lever on the winch. The drum is mounted on its shaft on plain bushings.

92. REMOVAL OF WINCH ASSEMBLY.

a. **Disconnect Drive Shaft** (fig. 103). Remove lock wire from set screw in collar at rear end of the drive shaft and loosen the set screw. Remove cotter pin from end of the shear pin and remove the shear pin. Slide the drive shaft universal joint off the end of the winch shaft.

b. **Remove Winch Assembly.** Remove six nuts and bolts which hold the winch assembly to the frame. Attach chain or rope from hoist around the left end of the winch drum. Raise winch slightly and swing it to the right enough so that its frame will clear the tow hook on the frame left side rail. Lift the winch assembly out of the chassis frame.

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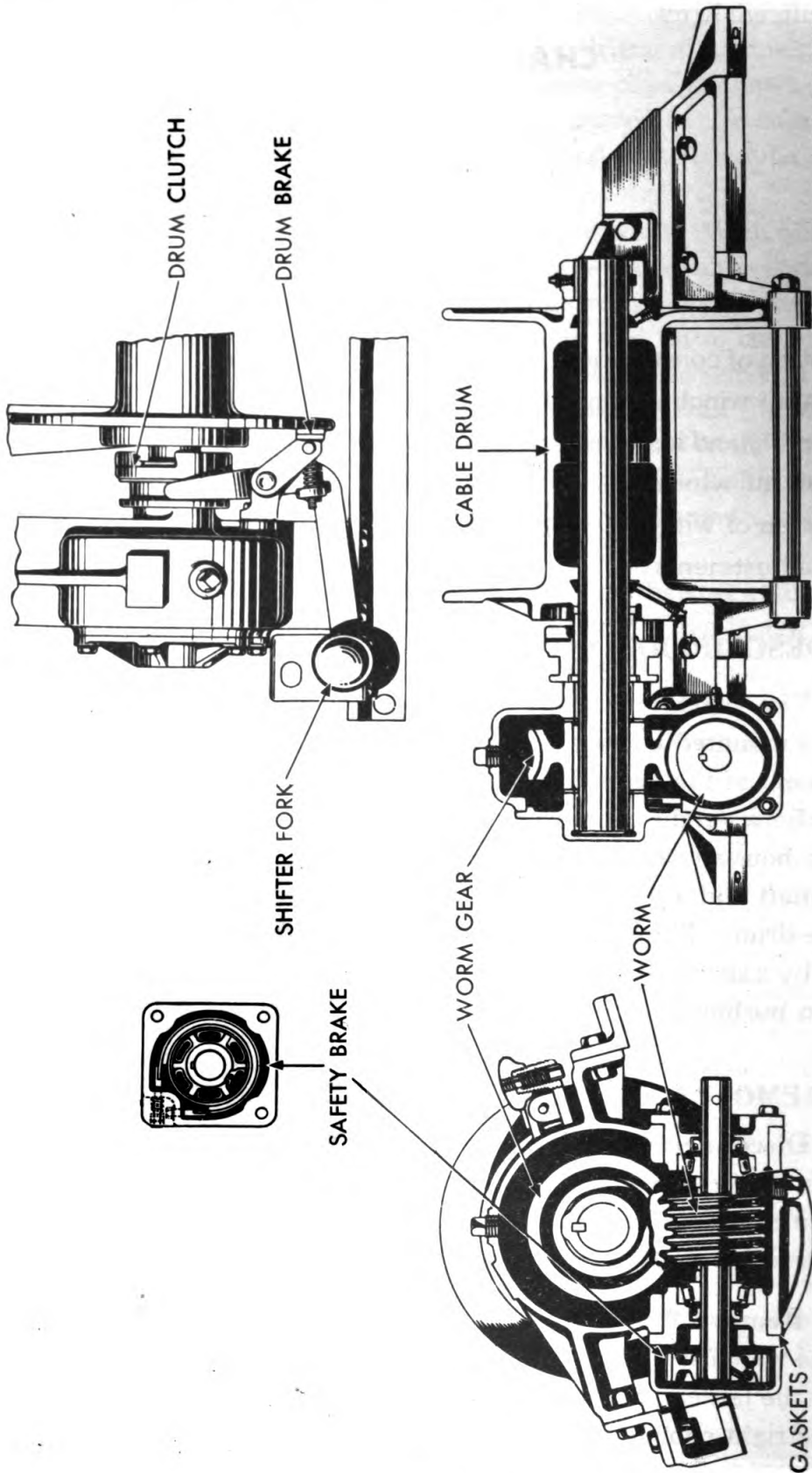
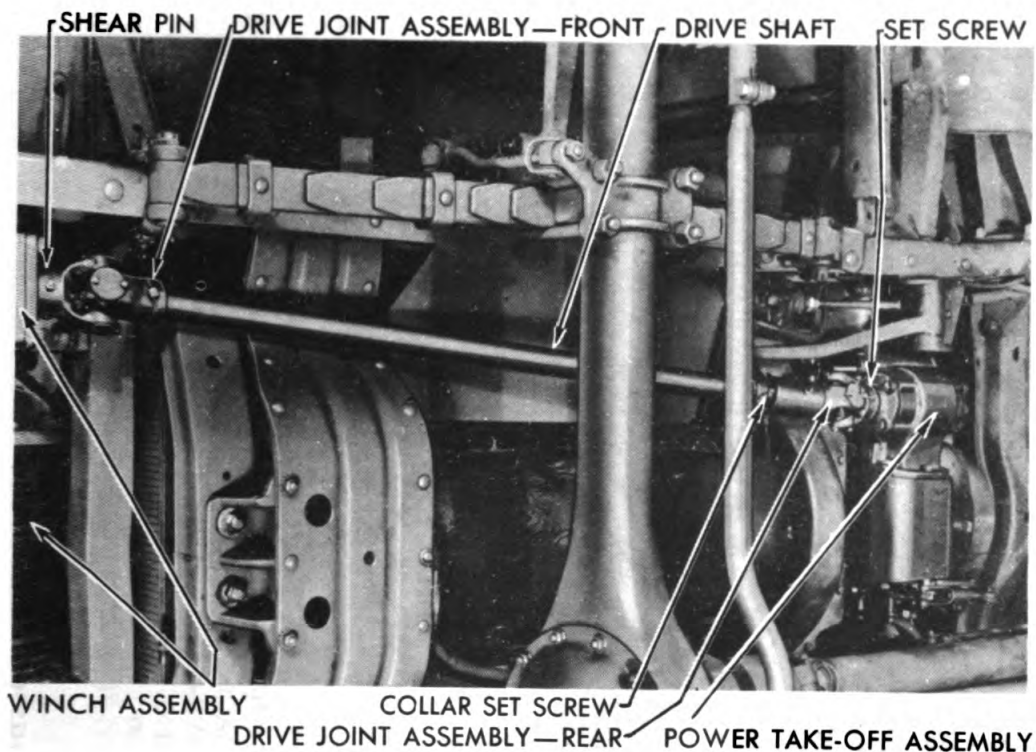


Figure 102—Winch Cross Section

WINCH



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Figure 103—Winch Universal Drive Shaft and Joint

93. DISASSEMBLY AND INSPECTION OF WINCH PARTS.

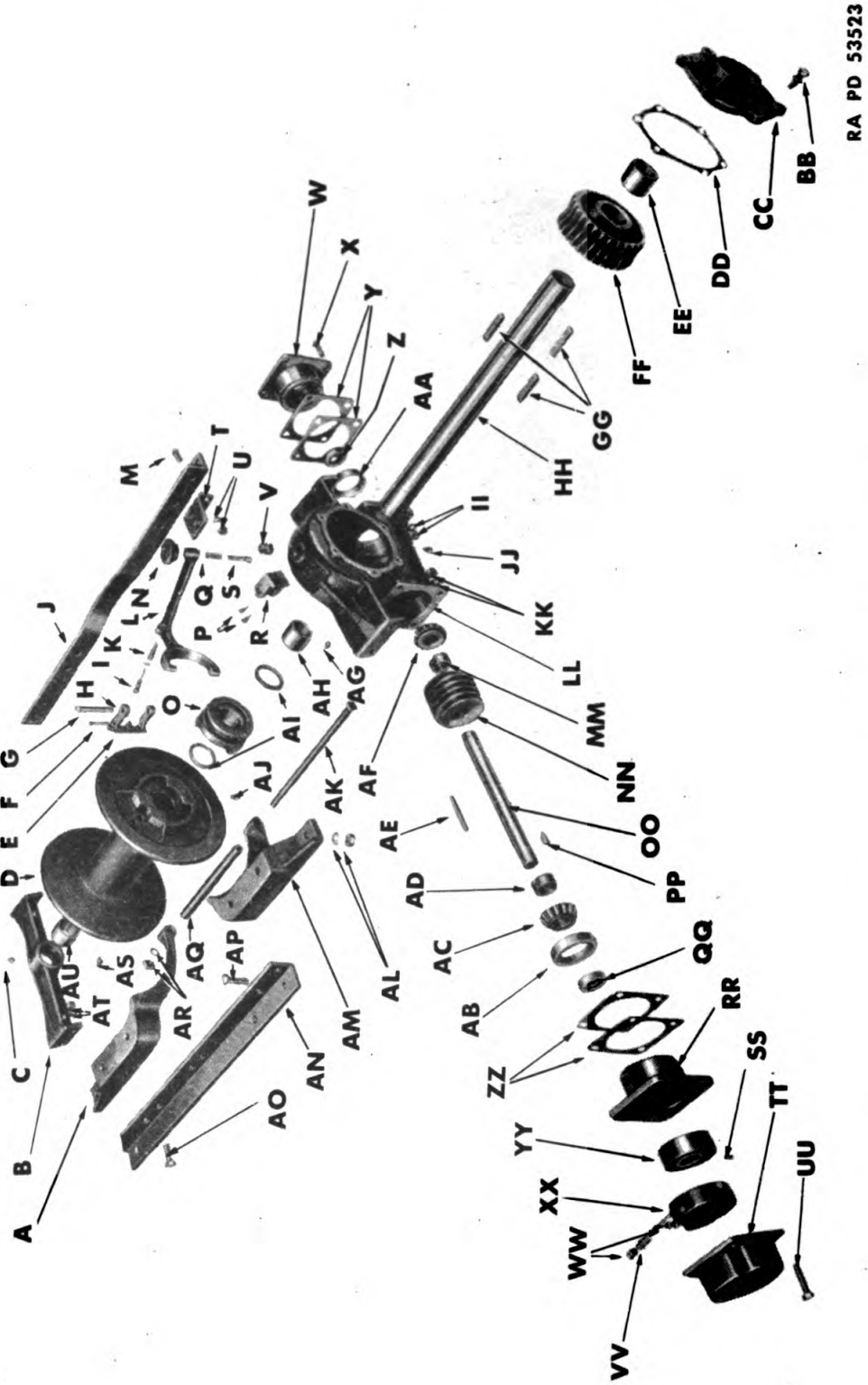
a. Drain Lubricant and Remove Winch Frame. Remove drain plug and drain lubricant from worm housing. Remove bolts which hold front and rear base angles to winch, housing cable guides attached to front base angle and shifter fork locating bracket attached to the rear base angle. Pull the shaft bracket off end of the cable drum shaft.

b. Remove Cable Drum and Clutch (fig. 104). Slide the cable drum off the shaft and remove the drum retainer ring. Remove the clutch shifter fork pivot pin and remove the shifter fork and clutch. Stand the winch on the worm end and drive down on the sliding clutch keys to remove them. Remove the other drum retainer ring.

c. Remove the Worm, Cable Drum Shaft and Gear (fig. 104). Remove four bolts which hold the safety brake and the worm housing bearing retainer to the front of the housing. Pull the worm assembly out of the housing. Remove the worm housing bearing retainer from the rear of the housing. Remove the worm housing cover and pull out the gear and cable drum shaft. Press the worm gear off the shaft.

d. Disassemble Worm (fig. 104). Loosen the set screw and pull off the safety brake drum. Remove the brake drum key and pull off the

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RA PD 53523

Figure 104—Winch Disassembled

WINCH

A —CABLE GUIDE—RIGHT	Y —BEARING RETAINER GASKETS	WW —SAFETY BRAKE BAND LOCK NUTS
B —CABLE DRUM SHAFT BRACKET	Z —WORM SHAFT OIL SEAL	XX —SAFETY BRAKE BAND AND LINING
C —LUBRICANT FITTING	AA —WORM THRUST BEARING CUP	YY —SAFETY BRAKE DRUM
D —CABLE DRUM	BB —SCREW AND LOCK WASHER	ZZ —BEARING RETAINER GASKETS
E —BRAKE SHOE LINING	CC —WORM HOUSING COVER	AB —WORM THRUST BEARING CUP
F —BRAKE SHOE LINK PIN	DD —WORM HOUSING COVER GASKET	AC —WORM THRUST BEARING CONE
G —SHIFTER FORK PIVOT PIN	EE —HOUSING COVER BUSHING	AD —WORM BEARING SPACER
H —BRAKE SHOE AND LINING	FF —WORM GEAR	AE —WORM KEY
I —BRAKE SHOE LINK	GG —KEYS	AF —WORM THRUST BEARING CONE
J —BASE ANGLE—REAR	HH —CABLE DRUM SHAFT	AG —LEVEL PLUG
K —BRAKE SHOE LINK SPRING	II —BOLT NUT AND LOCK WASHER	AH —WORM HOUSING BUSHING
L —SHIFTER FORK	JJ —DRAIN PLUG	AI —CABLE DRUM RETAINER RINGS
M —BASE ANGLE BOLT	KK —BOLT NUT AND LOCK WASHER	AJ —LUBRICANT FITTING
N —SHIFTER FORK KNOB	LL —WORM HOUSING	AK —CABLE GUIDE SPACER BOLT
O —SLIDING CLUTCH	MM —WORM BEARING SPACER	AL —BOLT NUT AND LOCK WASHER
P —SCREWS AND LOCK WASHERS	NN —WORM	AM —CABLE GUIDE—LEFT
Q —SHIFTER FORK SPRING	OO —WORM SHAFT	AN —BASE ANGLE—FRONT
R —SHIFTER FORK BRACKET	PP —SAFETY BRAKE DRUM KEY	AO —BASE ANGLE BOLT
S —SHIFTER FORK KNOB SHAFT	QQ —WORM SHAFT OIL SEAL	AP —BASE ANGLE BOLT
T —SHIFTER FORK LOCATING BRACKET	RR —WORM HOUSING BEARING RETAINER	AQ —CABLE GUIDE SPACER
U —BOLT NUT AND LOCK WASHER	SS —SAFETY BRAKE DRUM SET SCREW	AR —BOLT NUT AND LOCK WASHER
V —VENTED PLUG	TT —SAFETY BRAKE HOUSING	AS —LUBRICANT FITTING
W —WORM HOUSING BEARING RETAINER	UU —SAFETY BRAKE HOUSING BOLT	AT —BOLT NUT AND LOCK WASHER
X —BEARING RETAINER BOLT	VV —SAFETY BRAKE BAND SPRING	AU —SHAFT BRACKET BUSHING

RA PD 53523-B

Legend for Figure 104—Winch Disassembled

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worm bearing retainer. Pull the bearing cones and rollers from the worm shaft. Remove the bearing spacers and pull the worm from the shaft.

e. Clean and Inspect All Parts. Wash all parts except brake band and lining in dry-cleaning solvent, and inspect bearings and bushings and replace parts that show evidence of excessive wear or damage. Clean lubricant grooves in bushings. Examine the worm gear and replace if excessively worn or damaged. Inspect safety brake drum and lining and replace if worn. If worm shaft oil seals show signs of leaking lubricant, replace them. Inspect the drum brake lining and if worn or greasy, replace the lining.

f. Remove Oil Seals, Bushings and Bearing Cups (fig. 104). Pull the worm shaft oil seals and bearing cups from the housing bearing retainers. Press bushing from worm housing and cable drum shaft bracket. Cut the bushing from the worm housing cover.

g. Disassemble Drive Shaft Universal Joint (fig. 105). Remove screws which hold the bushing covers in place. Drive one yoke sideways to remove bushings from yoke and remove the cross.

94. ASSEMBLY OF WINCH.

a. Install Oil Seals, Bearing Cups and Bushings. Press worm shaft oil seals and bearing cups into both worm housing bearing retainers. Press bushing into worm housing, worm housing cover, and cable drum shaft bracket. Fit bushings to a good running fit.

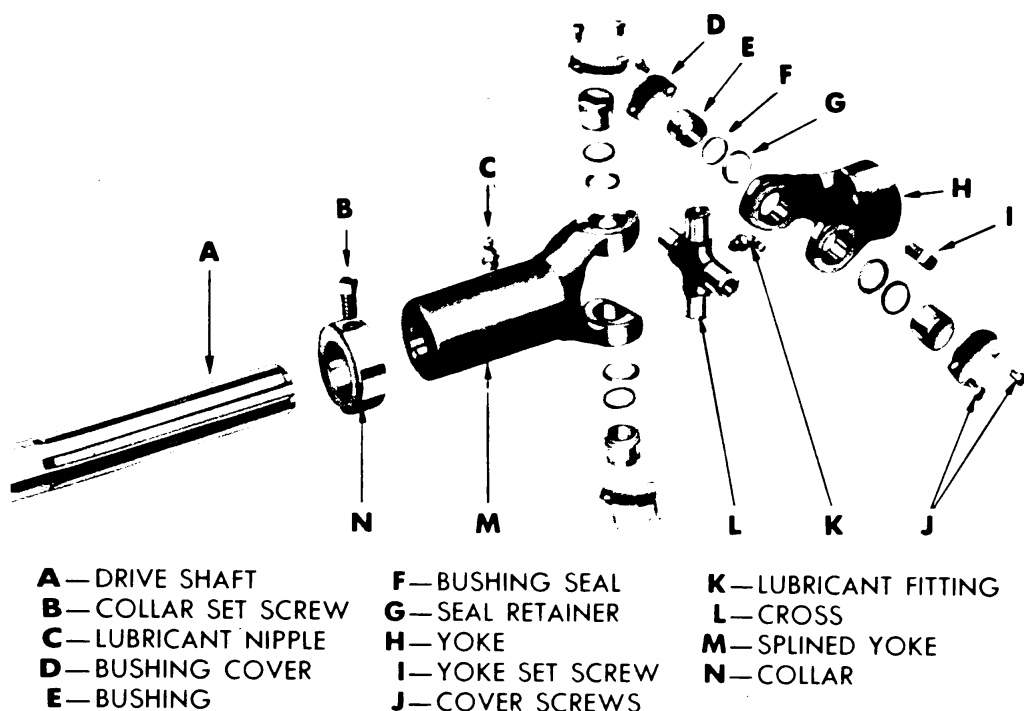
b. Assemble Worm Shaft (fig. 104). Place the worm key in the keyway and press the worm onto the shaft. Install a bearing spacer each side of the worm and press the thrust bearing cones and spacers against the worm. Place the worm shaft into the housing and install the front and rear worm housing bearing retainers with two gaskets under each retainer.

c. Adjust Worm Shaft Thrust Bearings. With both bearing retainers securely tightened to the housing, test the worm shaft by hand for bearing adjustment. If the worm cannot be turned by hand, the bearings are adjusted too tight. Remove the bearing retainer at the safety brake end of the shaft and insert an additional gasket. If, however, the worm turns freely and if there is any end play in the worm shaft, remove the bearing retainer and remove one gasket. Repeat the operation of adding or removing one gasket at a time until the worm shaft can be turned easily by hand with no perceptible end play. When the adjustment has been completed, remove the bolts from the bearing retainer at the safety brake end of the worm shaft and pull the shaft

WINCH

out. **Keep** the bearing retainer and gaskets in order on the shaft so that bearing adjustment will not be altered when the shaft is reinstalled.

d. Install Worm Gear and Cable Drum Shaft (fig. 104). Press the worm gear key into the keyway in the cable drum shaft on the end with the single keyway, and press the worm gear into position on the shaft, so that the gear hub extends $\frac{1}{8}$ inch beyond each end of the key. Place the worm gear and cable drum shaft into position in the housing.



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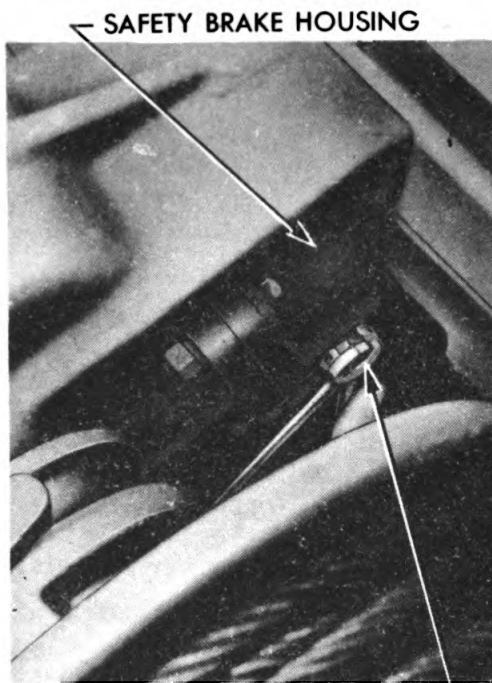
Figure 105—Winch Universal Drive Shaft and Joint Disassembled

e. Install Safety Brake and Worm Shaft (fig. 104). Assemble the safety brake band into the safety brake housing so that the long lug screw on the band projects to the left at the top of the housing when looking into the open side of the housing. Be sure to place the brake housing retaining screw under the brake adjustment in its hole before assembling the brake. Insert the drum key in the keyway of the shaft and drift the safety brake drum onto the worm shaft until the end of the drum hub is flush with the end of the shaft. Place the safety brake housing over the drum, with the projecting studs of the brake band in the upper right corner. Insert the worm shaft assembly into the worm housing and install the bolts which hold the bearing retainer and safety brake housing to the worm housing.

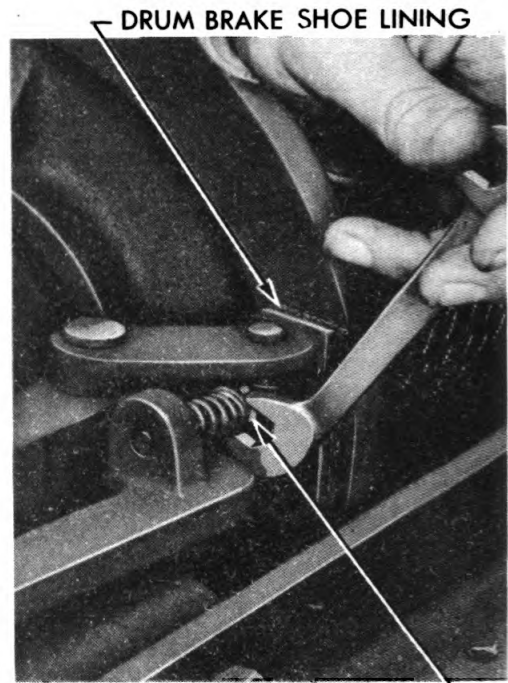
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f. **Install Shifter, Clutch and Worm Housing Cover.** Place one of the drum retainer rings on the cable drum shaft, then install the clutch keys in the shaft. Place the clutch, shifter fork and brake assembly into position and install the shifter fork pivot pin. Install the worm housing cover.

g. **Install Cable Drum and Frame.** Place the remaining drum retainer ring on the shaft and install the cable drum. Install the front and rear bore angles and the cable drum shaft bracket. Lubricate at fittings and at filler plug.



BAND ADJUSTING AND LOCK NUTS
1—SAFETY BRAKE ADJUSTMENT



SHOE ADJUSTING AND LOCK NUTS
2—DRUM BRAKE ADJUSTMENT

RA PD 53505

Figure 106—Adjusting Winch Brakes

h. **Assemble Drive Shaft Universal Joint** (fig. 105). Place the cross in the yokes and place oil seal and oil seal retainer, one at each end of the cross. Press the bushings into yokes and install the bushing covers and attaching screws.

95. INSTALLATION OF WINCH ASSEMBLY.

a. **Install Winch in Truck and Connect Drive Shaft.** Attach chain or rope from hoist around the left end of the winch drum, and hoist the winch above chassis frame and a little to the right of its installed position, so that when it is lowered, its frame will clear the tow-hook on the frame left side rail. Lower the winch into the chassis and swing it to

WINCH

the left and into position. Install the six mounting bolts with standard lock washers and nuts. Place the drive shaft universal over end of winch shaft and align shear pin holes. Insert shear pin and install cotter pin through end of the shear pin. Slide the collar at the rear end of the drive shaft back to within $\frac{5}{8}$ inch of the rear universal joint yoke, tighten set screw and install lock wire. Fill the worm housing with lubricant.

96. WINCH ADJUSTMENTS.

a. **Adjust Safety Brake** (fig. 106). Adjust safety brake so that winch will hold a normal load when power take-off is shifted to the neutral position. Turn the adjusting nut $\frac{1}{2}$ turn at a time until adjustment is made (1, fig. 106). Tighten lock nut securely. A correctly adjusted safety brake will heat somewhat in operation but if the hand cannot be held on the brake case, the brake adjustment is too tight.

b. **Adjust Drum Brake** (fig. 106). Adjust the drum brake so that the drum will not spin when the cable is pulled from the drum (2, fig. 106). Increase the tension on the brake shoe link spring to stop drum spinning and reduce the tension on the spring if the drum turns too hard.

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CHAPTER 3

CHASSIS (Cont'd)

Section VIII

FITS AND TOLERANCES—CHASSIS

	Paragraph
Fit and tolerances	97

97. FITS AND TOLERANCES.

a. Foot Brakes.	Standard	Maximum Allowable
Shoe clearance at heel	0.006-in.	
Shoe clearance at toe	0.012-in.	
Pedal free travel	$\frac{7}{16}$ -in.	
Wheel cylinder bore diameter (front)	1.250-in.	1.253-in.
Wheel cylinder bore diameter (rear)	1.375-in.	1.378-in.
Wheel cylinder piston diameter (front)	1.248-in.	
Maximum allowable wear		0.001-in.
Wheel cylinder piston diameter (rear)	1.373-in.	
Maximum allowable wear		0.001-in.
Wheel cylinder piston clearance		0.003-in.
Master cylinder bore	1.249-in.	1.253-in.
Master cylinder piston diameter	1.247-in.	
Maximum allowable wear		0.001-in.
Master cylinder piston clearance		0.003-in.
b. Hand Brake.		
Band clearance	0.010-in.	0.012-in.
c. Steering Gear.		
Steering gear shaft bushing reamed diameter	1.374-in.	1.375-in.
Steering gear shaft diameter	1.373 to 1.374-in.	
Shaft wear		0.002-in.
Bushing clearance		0.004-in.
Worm bearing preload	12 to 24-in. lb	
Overall preload	24 to 34-in. lb	
d. Frame Dimensions (see par. 84).		

CHAPTER 4

BODY

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Replacement of door latch and remote control	100
Replacement of vertical sliding glass and frame	101
Replacement of window glass and regulator (carryall)	102
Replacement of top decking (carryall)	103
Disassembly of windshield wiper motor	104
Inspection of wiper motor parts	105
Assembly of windshield wiper motor	106

98. GENERAL DESCRIPTION.

a. General. The various model $\frac{3}{4}$ ton, 4 x 4 and $1\frac{1}{2}$ ton, 6 x 6 trucks are listed in paragraph 3. The body equipment used on the various models is described below:

(1) **WEAPON CARRIER (MODELS WC-51 AND 52)** (fig. 107). The body is of the stake type with separately mounted open cab. Bows and tarpaulin covering are furnished with each truck.

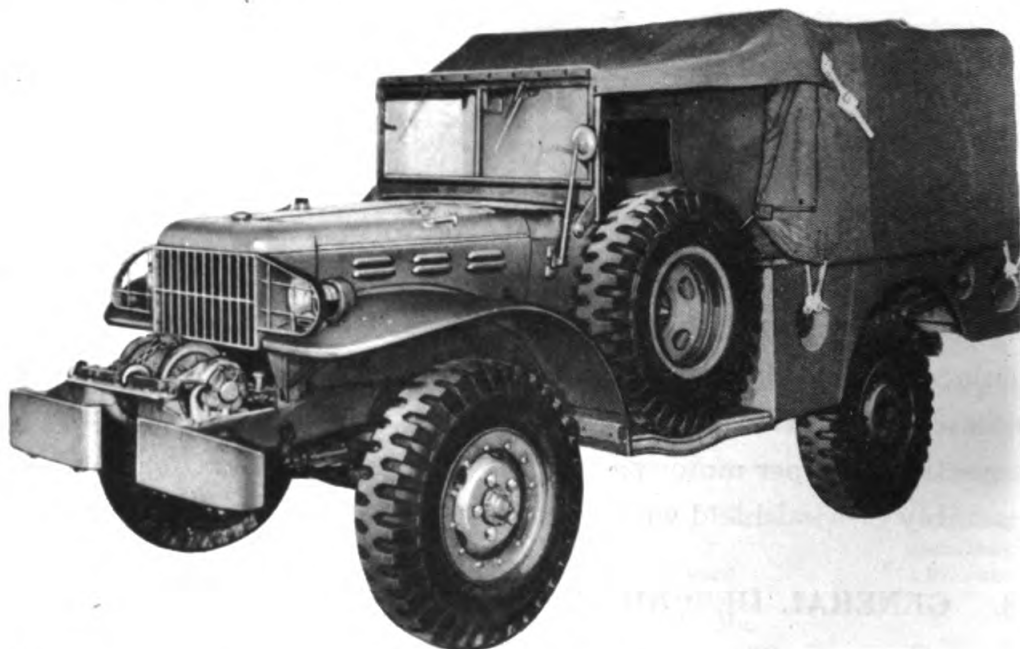
(2) **COMMAND FIELD SEDAN (MODEL WC-SPECIAL 53)** (fig. 108). The body is the same general type as supplied with the carryall (model WC-53), except that side doors are provided for easier access. The rear compartment contains map table, special seats, lighting, and provision for complete blackout within the body.

(3) **CARRYALL (MODEL WC-53)** (fig. 107). The closed type body is equipped with a door on each side of the driver's compartment, and side windows opposite the passenger seats. The top decking is fabric material and is replaceable. A storage compartment is accessible from the rear of the body.

(4) **AMBULANCE (MODEL WC-54)** (fig. 108). The closed type body is equipped with a door on each side of the driver's compartment and a double swinging door at the rear of the body. It contains first aid equipment for the care of wounded personnel.

(5) **37-MM GUN MOTOR CARRIAGE, M6 (MODEL WC-55)** (fig. 109). The body and open cab are of the same general type as supplied on the weapon carrier (models WC-51 and 52). A 37-mm gun is mounted on the body.

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$\frac{3}{4}$ TON 4 x 4

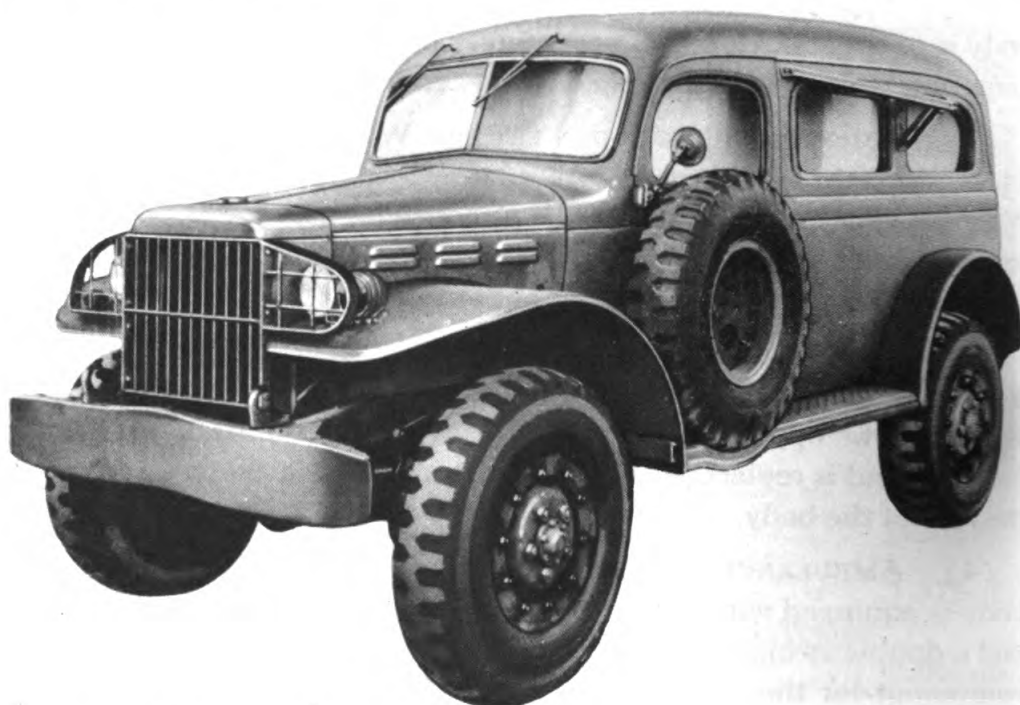
WEAPON CARRIER

MODEL WC-51

$\frac{3}{4}$ TON 4 x 4

WEAPON CARRIER WITH WINCH

MODEL WC-52



$\frac{3}{4}$ TON 4 x 4

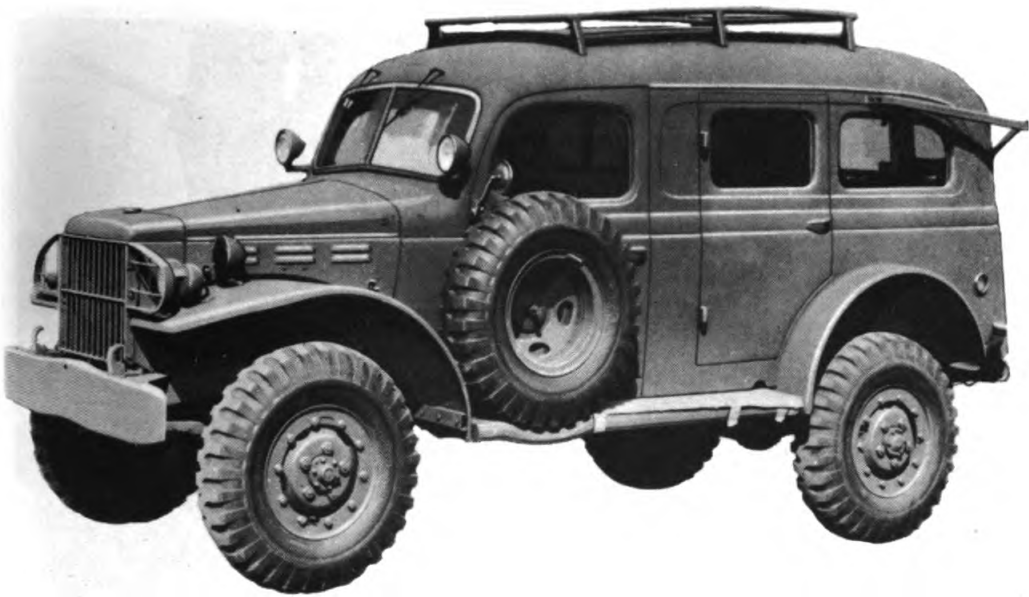
CARRYALL

MODEL WC-53

RA PD 53525

Figure 107—Weapon Carrier and Carryall

BODY



3/4 TON 4 x 4

COMMAND FIELD SEDAN

WC-53 (SPECIAL)



3/4 TON 4 x 4

AMBULANCE

WC-54

RA PD 53526

Figure 108—Command Field Sedan and Ambulance

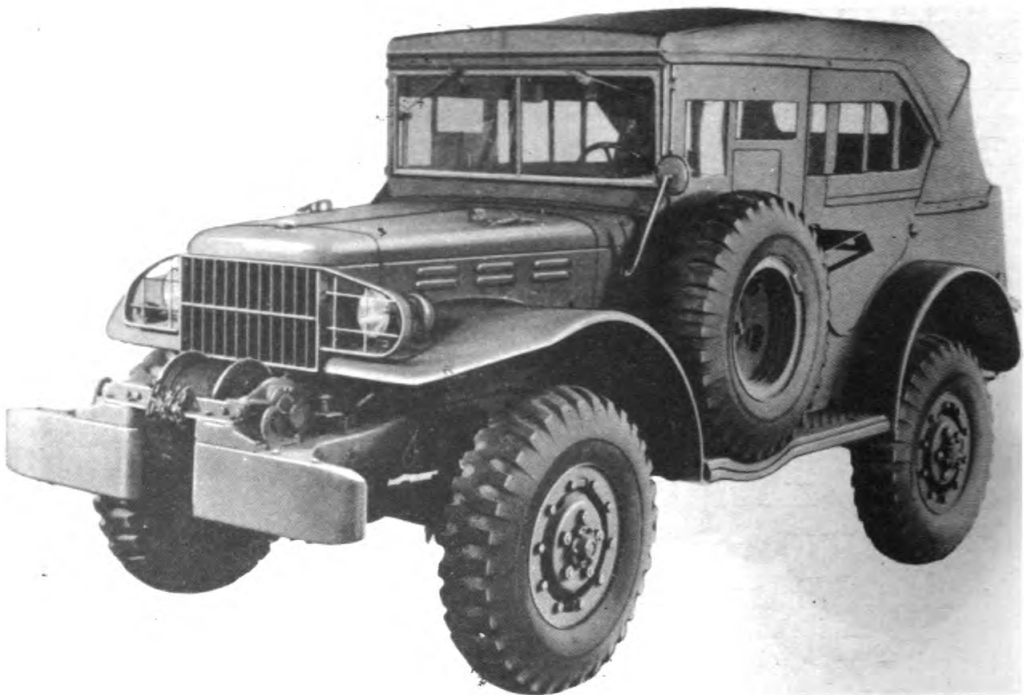
**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1 $\frac{1}{2}$ TON 6 x 6 (DODGE)**



$\frac{3}{4}$ TON 4 x 4

37 MM. GUN MOTOR CARRIAGE M-6

WC-55



$\frac{3}{4}$ TON 4 x 4
 $\frac{3}{4}$ TON 4 x 4
 $\frac{3}{4}$ TON 4 x 4

COMMAND
COMMAND WITH WINCH
RADIO

MODEL WC-56
MODEL WC-57
MODEL WC-58

RA PD 53527

Figure 109—37-mm Gun Motor Carriage and Command

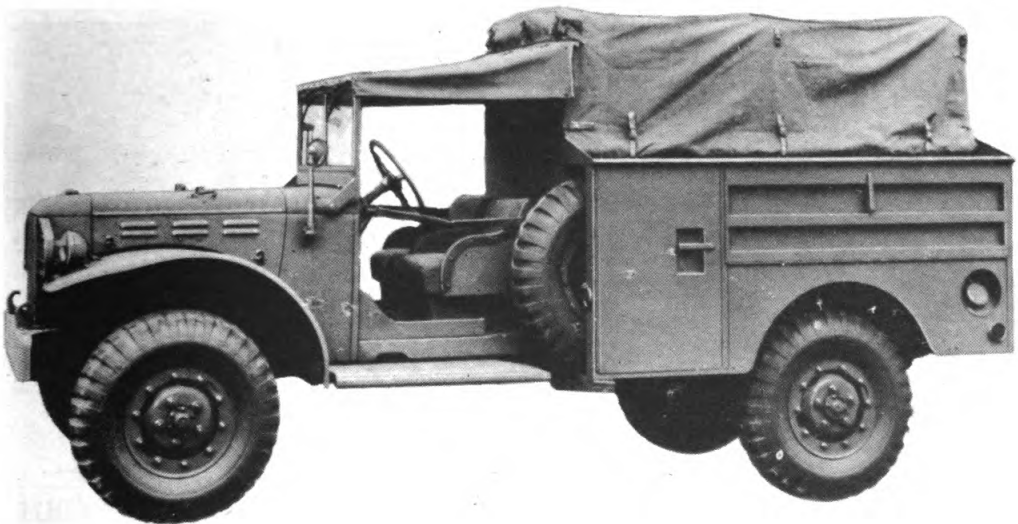
BODY



3/4 TON 4 x 4

**TELEPHONE MAINTENANCE
AND INSTALLATION**

MODEL WC-59



3/4 TON 4 x 4

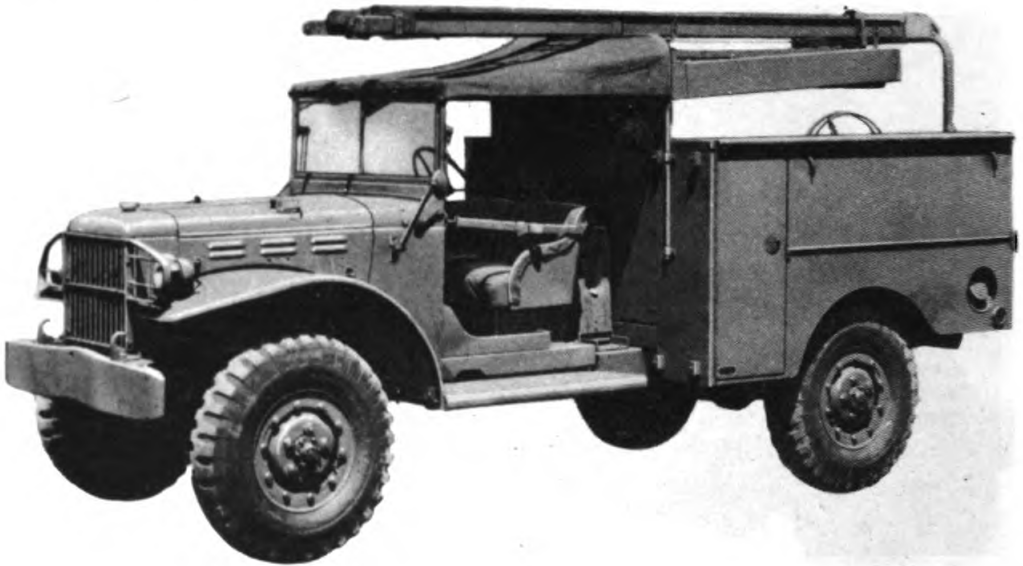
EMERGENCY REPAIR

MODEL WC-60

RA PD 53528

**Figure 110—Telephone Maintenance Installation and
Emergency Repair**

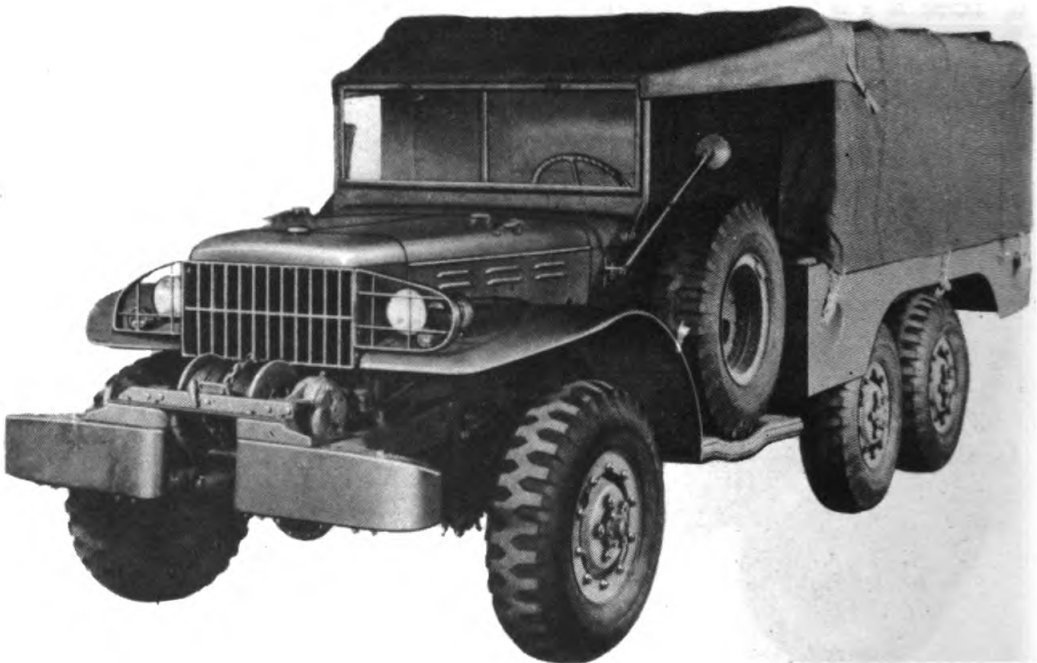
**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND $1\frac{1}{2}$ TON 6 x 6 (DODGE)**



$\frac{3}{4}$ TON 4 x 4

**TELEPHONE MAINTENANCE
(4551 BODY)**

MODEL WC-61



$1\frac{1}{2}$ TON 6 x 6

PERSONNEL CARRIER AND CARGO

MODEL 62

$1\frac{1}{2}$ TON 6 x 6

**PERSONNEL CARRIER AND CARGO
WITH WINCH**

MODEL 63

RA PD 53529

**Figure 111—Telephone Maintenance—Personnel Carrier
and Cargo**

BODY

(6) **COMMAND (MODELS WC-56 AND 57)** (fig. 109). The body is an open passenger type, equipped with soft top that may be raised or lowered.

(7) **RADIO (MODEL WC-58)** (fig. 109). The body is the same type as supplied on the command (models WC-56 and 57).

(8) **TELEPHONE MAINTENANCE AND INSTALLATION (MODEL WC-59)** (fig. 110). The boxed-shaped body contains trays, drawers and storage spaces for tools, apparatus and equipment used for maintenance of communication systems. The cab is the open type with tarpaulin roof cover.

(9) **EMERGENCY REPAIR (MODEL WC-60)** (fig. 110). The body is the open type with roof tarpaulin and side compartments for the stowage of repair equipment. The cab is the open type with tarpaulin roof cover.

(10) **TELEPHONE MAINTENANCE (MODEL WC-61)** (fig. 111). The body is the same general style as supplied with the emergency repair (model WC-60) but modified for mounting of ladder across the top of the body. The cab is the open type with tarpaulin roof cover.

(11) **PERSONNEL CARRIER AND CARGO (MODELS WC-62 AND 63)** (fig. 111). The body is of the stake type with side seats and roof tarpaulin. The cab is the open type with tarpaulin roof cover.

99. REPLACEMENT OF WINDOW LIFT REGULATOR.

a. **Remove the Glass and Frame Assembly** (par. 101 a and b).

b. **Remove Regulator from Door** (fig. 112). Remove the screws which hold the regulator base to the door and remove the regulator through the opening in the door panel (1, fig. 112).

c. **Install Regulator in Door.** Insert the regulator through the opening in the door panel in the same position shown for removal (1, fig. 112). Install the screws which hold the regulator base to the door panel.

d. **Install the Glass and Frame Assembly** (par. 101 c and d).

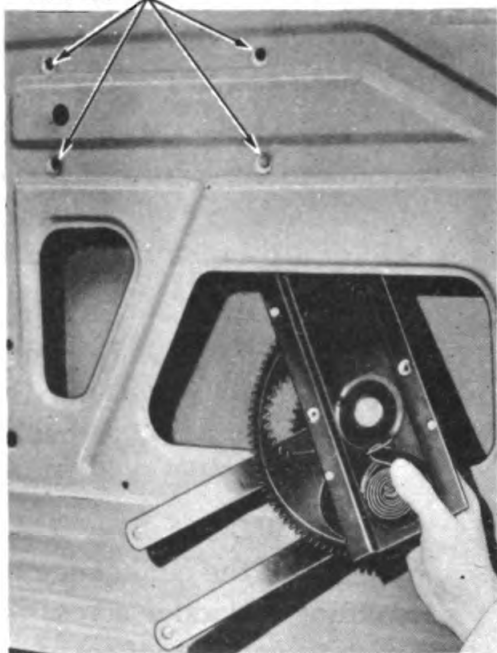
100. REPLACEMENT OF DOOR LATCH AND REMOTE CONTROL.

a. **Remove the Glass and Frame Assembly** (par. 101 a and b).

b. **Remove Door Handle and Remove Control Bracket** (fig. 112). Remove the outside door handle screws and pull out the handle. Remove the latch plate screws from the edge of the door. Remove the screws which hold the remote control bracket to the door panel. Discor

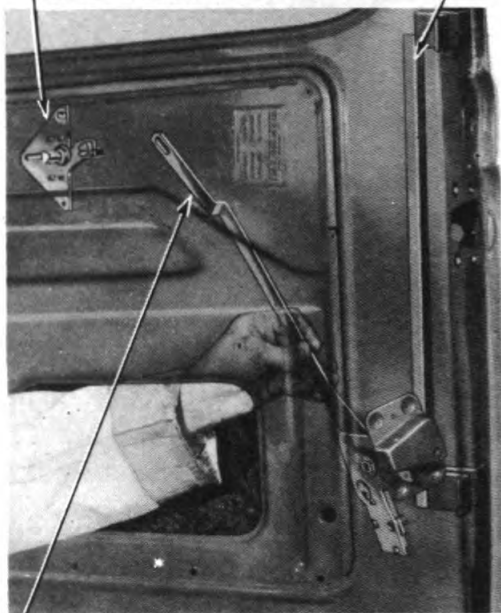
**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1 $\frac{1}{2}$ TON 6 x 6 (DODGE)**

REGULATOR ATTACHING SCREW HOLES



**1—REMOVING DOOR WINDOW
REGULATOR**

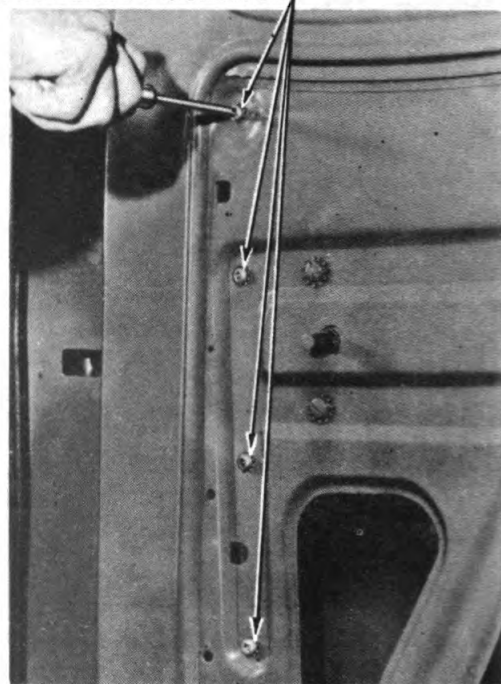
GLASS LOWER RUN CHANNEL—REAR
REMOTE CONTROL BRACKET



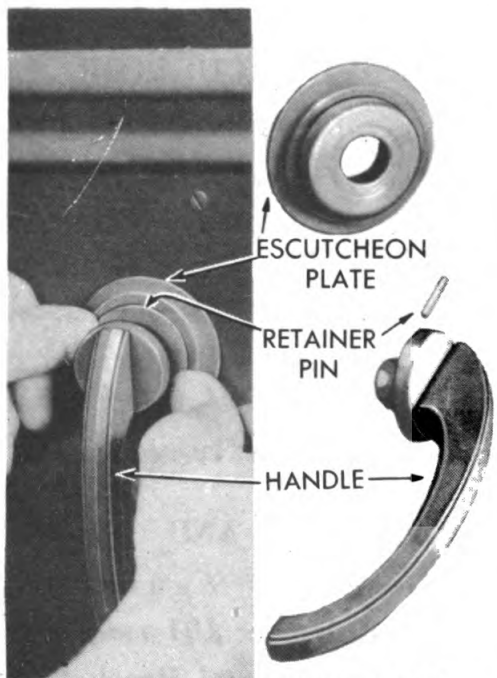
LATCH REMOTE CONTROL ASSEMBLY

**2—REMOVING DOOR LATCH AND
REMOTE CONTROL**

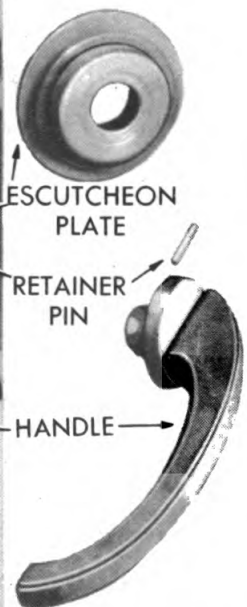
FRONT GLASS RUN CHANNEL
ATTACHING SCREWS



**4—REMOVING FRONT GLASS
RUN CHANNEL**



**3—REMOVING INSIDE DOOR
HANDLE**



ESCUTCHEON
PLATE

RETAINER
PIN

HANDLE

RA PD 53506

Figure 112—Disassembling Door (Closed Bodies)

BODY

nect the remote control (2, fig. 112) from the remote control strap by turning it approximately 90 degrees and pulling it out.

c. **Remove Latch and Control from Door** (fig. 112). Slide the latch down the door to the lower bracket on the rear glass run channel. Then lift the remote control strap to an upright position and work it out between the inside door panel and the glass run channel (2, fig. 112). The assembly may then be withdrawn through the large opening in the inside door panel.

d. **Install Latch and Control in Door.** Insert the assembly through the large opening in the door panel and work it in between the inside door panel and the glass run channel (2, fig. 112). Raise the latch into position and install the attaching screws at the edge of the door. Install outside door handle.

e. **Install Remote Control Bracket and Door Handle.** Connect the remote control strap to bracket and install the bracket mounting screws. The bracket mounting holes are elongated to permit moving the bracket to the correct position for operation of the locking device. Locate the bracket so that when the inside door handle is moved to the locked position the outside door handle cannot be turned.

f. **Install the Glass and Frame Assembly** (par. 101 c and d).

101. REPLACEMENT OF VERTICAL SLIDING GLASS AND FRAME.

a. **Remove Inside Door Handles and Trim Panel** (fig. 112). Press the escutcheon plates away from the inside door handle and window lift regulator handle and remove the pins and handles (3, fig. 112). Remove the screws which hold the trim panel to the door and remove the panel.

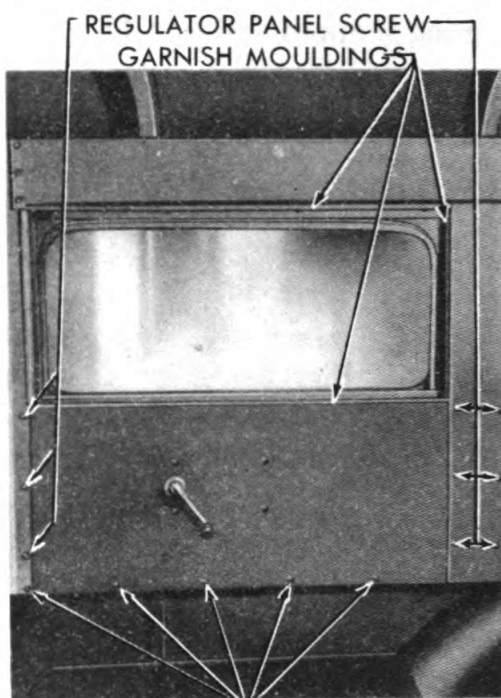
b. **Remove Glass and Frame Assembly.** Remove the screws which hold the glass front channel at the hinge side of door (4, fig. 112). Draw the channel down and out through the opening in the door. Run the window all the way down and remove the screws in the glass lower channel and unhook the window lift rollers from the lower channel. Lift the glass and frame assembly from the door (1, fig. 113).

c. **Install Glass and Frame Assembly.** Make sure the window run channels are in good condition and in alinement. Slide the glass and frame assembly through the window opening into the door. Hook the window lift rollers to the glass lower channel and install the attaching screws. Install the screws which hold the glass front channel at the hinge side of the door. Check for proper operation and travel of glass and frame assembly.

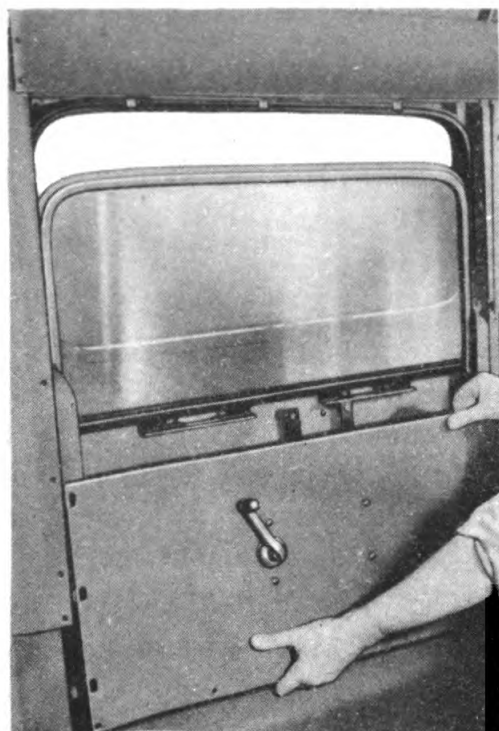
**ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY
FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1 $\frac{1}{2}$ TON 6 x 6 (DODGE)**



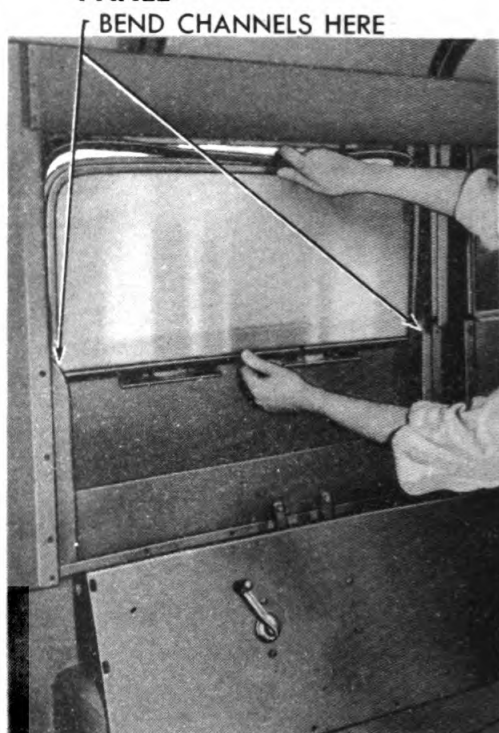
1—REMOVING DOOR GLASS



**2—SIDE WINDOW REGULATOR
PANEL**



**3—REMOVING SIDE WINDOW
REGULATOR PANEL**



**4—REMOVING SIDE WINDOW
GLASS**

RA PD 53507

**Figure 113—Removing Window Glass and Regulator
(Closed Bodies)**

BODY

d. **Install Trim Panel and Inside Door Handles** (fig. 112). Hold the trim panel in place and install the attaching screws. Place the escutcheon plates and springs over the inside door handle shafts and press the plates against the trim panel until the pin hole in the shaft is uncovered. Slide the handle on the shaft and install the pin.

102. REPLACEMENT OF WINDOW GLASS AND REGULATOR (CARRYALL).

a. **Remove Regulator** (fig. 113). Remove garnish moulding screws and garnish moulding (side pieces first). Remove the screw which holds the regulator panel to the body (2, fig. 113). Remove trim panel from between windows, turn regulator handle as though winding window up. This will force the regulator panel down and at the same time bring the regulator arms together and out of the glass frame (3, fig. 113). Remove the regulator from the panel.

b. **Remove Glass and Frame Assembly** (fig. 113). Bend the ends of the channels out away from the glass runs (4, fig. 113) and pull glass run loose from clips along the top of the window opening. Raise the glass as far as possible and pull out at the top to remove the glass and frame.

c. **Replace Glass and Frame Assembly.** Lower the glass into position and install the glass run in the clips along the top of the window opening. Bend the ends of the channels back into position.

d. **Install Regulator.** Attach the regulator to the regulator panel. Turn the regulator handle to bring the regulator arms together. Hold the panel with the arms between the brackets on the glass frame and turn the regulator handle to spread the arms into place and raise the panel into position. Install the trim panel between the windows. Install the screws which hold the regulator.

103. REPLACEMENT OF TOP DECKING (CARRYALL).

a. **General.** The fabric top decking is locked into a channel by means of a specially shaped locking strip. No screws or nails are used to hold the decking in place.

b. **Remove the Top Decking.** Pry out the wire stitch which joins the ends of the locking strip. Lift one end of the locking strip with a screwdriver and pull the strip up and out of the channel. Lift off the top decking.

c. **Install Top Decking.** Cut decking material the shape of the channel, leaving a two-inch margin on all sides. Cut several pieces one inch long from the old locking strip. Press the material into the channel

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)

at the exact center in the front and lock it in place with a piece of locking strip about one inch long. Starting from the center at the front end, work the decking down into the channel toward each side alternately, stretching it as tightly as possible and firmly locking it in place with one-inch pieces of locking strip. These should be spaced about six inches or eight inches apart and continue all around the top decking.

d. **Install the Locking Strip.** Remove the short block of locking strip from the front center of the decking and press into its place the center of the long locking strip, tapping it down securely with a mallet. Lubricate the top decking, at the channel, with soapy water and tap the locking strip into place all around the roof, working from the center toward and along each side for three or four inches at a time, alternating the process on each side and pulling out the short blocks of locking strip as each is approached. When the locking strip has been tapped into place all around, cut the ends so that the joint will be tight and in the rear center of the roof. Fasten the ends together with a wire staple.

e. **Trim and Seal Top Decking.** Trim the edge off the decking with a sharp knife blade pointing under the top flange of the locking strip and just far enough to cut decking and not the vertical part of the locking strip at the top of the channel in the body. Make certain that the locking strip is in place all around by tapping again with a mallet, then work top sealer between the inner flange of the locking strip and the decking all around the roof. Then work top sealer under the outer flange of the locking strip all around the roof.

104. DISASSEMBLY OF WINDSHIELD WIPER MOTOR.

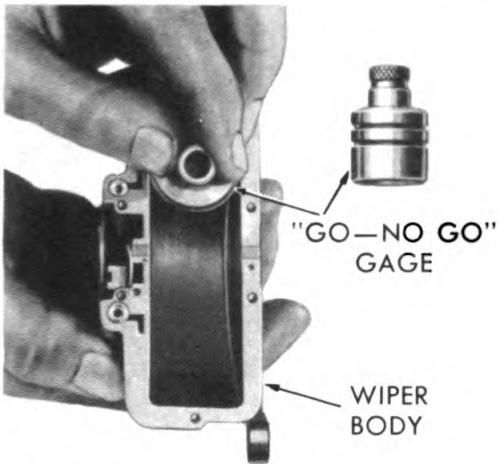
a. **Remove Manual Operating Lever, Mounting Bracket and Valve Housing Cover.** Loosen the set screw and slide the manual operating lever off the shaft. Remove the two screws which hold the mounting bracket to the wiper body. Remove two screws which hold the valve housing cover to the wiper body.

b. **Remove Valves and Paddle.** Unhook the kicker spring, using special wire hook, and remove the tripper and valves. Remove six screws which hold the body cover in place, unhook the kicker from the cover and lift the cover off. Lift the shaft and paddle out of the wiper body.

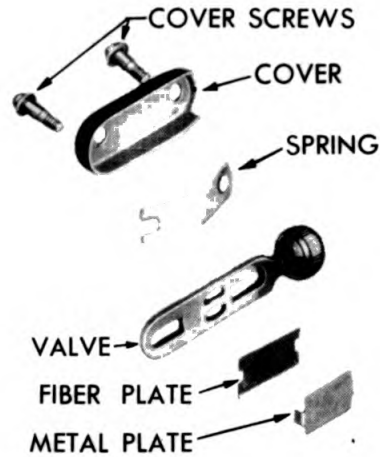
105. INSPECTION OF WIPER MOTOR PARTS.

a. **Clean and Inspect Motor Body.** Wash the motor body with dry-cleaning solvent, and check the body with "Go" and "No Go" gage (1, fig. 114). The gage has three different diameters. If only the lower

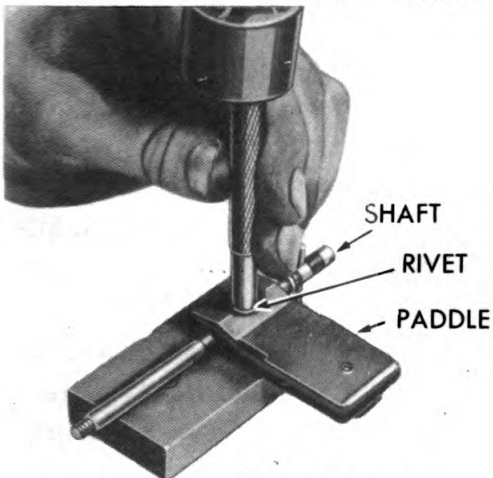
BODY



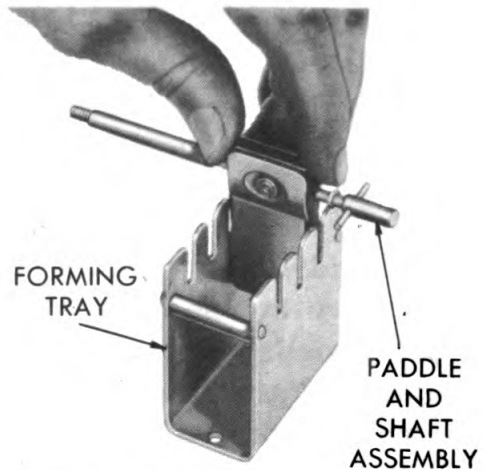
1—CHECKING WIPER BODY WITH "GO-NO GO" GAGE



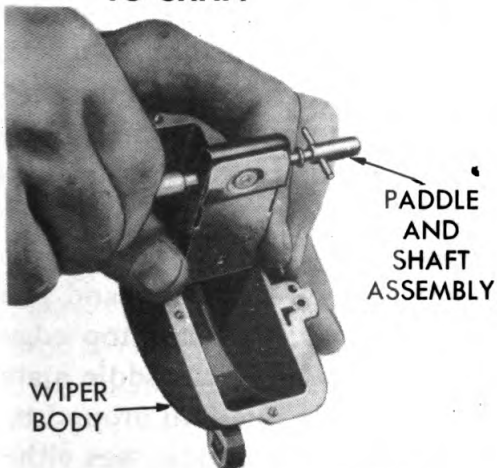
2—SLIDE VALVE PARTS



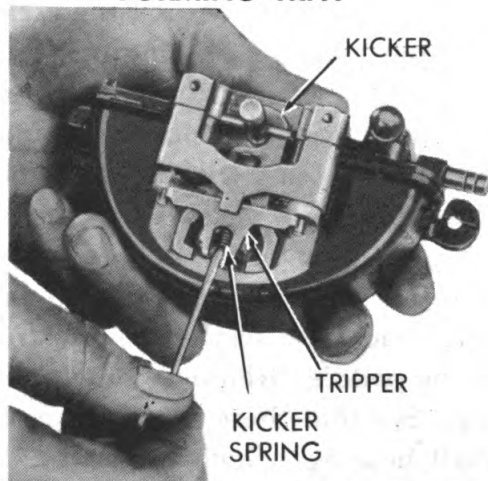
3—ASSEMBLY OF PADDLE TO SHAFT



4—PLACING PADDLE IN FORMING TRAY



5—INSERTING PADDLE IN WIPER BODY



6—ATTACHING KICKER SPRING

RA PD 53508

Figure 114—Windshield Wiper Rebuilding with Repair Kit (41-K-280)

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diameter enters the body, the body is too narrow. If the center diameter enters the body but the upper diameter will not enter the body, the body width is satisfactory. If the upper diameter also enters the body, the body is too wide. If the housing width is not satisfactory, replace the wiper motor assembly.

b. **Inspect Paddle and Valves.** Remove the two screws from the slide valve cover and remove the cover, carefully noting the position of the valve parts. Clean and inspect the slide valve parts and if damaged, replace the wiper motor. Inspect the edges of the paddle for indications of a poor seal and replace if the seal is not good. If the paddle is replaced, drift the valve bushings out of the wiper body and replace valve bushings.

106. ASSEMBLY OF WINDSHIELD WIPER MOTOR.

a. **Assemble Slide Valve and Paddle.** Assemble the slide valve parts into the valve cover in the order shown in 2, figure 114. Place a drop of fine oil in the sliding valve and attach the valve to the body cover. Pack the inside of a new paddle with wiper motor lubricant. Place the paddle over the shaft, with the round parking lift leather on the paddle down when the blade end of the shaft is to the right, and install rivet through the paddle and shaft (3, fig. 114).

b. **Install Shaft and Paddle Assembly.** Form the sides and bottom edges of the paddle toward the center of the paddle by running the round shank of a screwdriver up and down the edges. Then place paddle in forming tray (4, fig. 114) and allow paddle to sit in tray for a few minutes. Spread wiper lubricant lightly on the inside walls of the wiper body. Hook the kicker over the shaft. Insert the paddle in wiper body by holding fingers at the edge of the body and forcing the paddle straight down between the fingers (5, fig. 114) (this is to prevent cutting or chipping the paddle). Form the paddle around the shaft by pressing with the flat side of the screwdriver, being careful to always keep the screwdriver flat against the paddle to avoid damaging the paddle material. Place the body cover over the paddle but do not install screws. Hold the cover down against paddle lightly and turn shaft back and forth in short strokes toward and from the top edges of the paddle. Remove cover and inspect top forming of paddle material. See that there are no chips from the paddle material around the shaft bearings. Such chips would indicate that the paddle was either not properly formed or the cover was not held evenly while forming the top of the paddle.

c. **Install Body Cover and Valves.** Place new paper gaskets on the body and install the cover and attaching screws. Hook the kicker

BODY

spring to the kicker and hook the kicker over the boss on body cover. Install the valves in the valve bushings and slide a felt washer into the groove on each valve. Install the valve tripper (6, fig. 114) and hook the kicker spring to the tripper. Install the valve housing cover.

d. Install Mounting Bracket and Manual Operating Lever.

Place the plain washer, then felt washer, over the blade end of the shaft. Slide the mounting bracket over the shaft and install the attaching screws. Slip the manual operating lever onto the other end of the shaft and tighten the set screw.

e. Test Operation of Wiper Motor. Attach wiper motor to suction line. Turn wiper on, then hold the wiper shaft against the pull of the paddle piston. Check this in each direction. Listen for escaping air which would indicate leakage. Gradually move the paddle through full stroke of wiper and if leakage occurs, check for poor assembly of motor.

ORDNANCE MAINTENANCE—POWER TRAIN, CHASSIS AND BODY FOR BASIC VEHICLES, $\frac{3}{4}$ TON 4 x 4, AND 1½ TON 6 x 6 (DODGE)

CHAPTER 5

SPECIAL TOOLS

	Paragraph
Tool equipment	107

107. TOOL EQUIPMENT.

a. Following is a listing of tools specified in this manual for disassembly and assembly of units of the power train, chassis and body of Dodge $\frac{3}{4}$ ton, 4 x 4 and 1½ ton, 6 x 6 trucks.

Description	Federal Stock Number
Adapter, torque wrench, differential bearing.....	41-A-14-200
Adapter, torque wrench, front axle universal drive assembly.....	41-A-30-250
Arbor, transfer case idler shaft bearing (1½ ton, 6 x 6 truck).....	41-A-338
Calipers, micrometer, outside.....	41-C-307
Clamp, hydraulic brake cylinder.....	41-C-1835
Drift, installing, front axle housing and steering knuckle bushing oil seal and $\frac{3}{4}$ ton 4 x 4 truck transfer case oil seals.....	41-D-1535-25
Drift, installing, pillow block bearing cup and transfer case bearing cup.....	41-D-1546-60
Drift, oil seal installing wheel bearings, axle drive pinion shaft and rear spring trunnion bearing....	41-D-1535-50
Filler, hydraulic brake.....	41-F-2982
Gage, front axle turning radius.....	41-G-449
Gage, toe-in.....	41-G-510
Grinder, hydraulic brake cylinder.....	40-G-103
Indicator, portable wheel alinement.....	41-I-130
Indicator, universal, dial type.....	41-I-100
Kit, windshield wiper repair.....	41-K-280
Lathe, electric brake drum.....	40-L-15
Machine, combination brake relining, grinding, riveting and drilling.....	40-M-3
Pliers, brake shoe spring.....	41-P-1579
Puller, plate, axle drive pinion bearing ($\frac{3}{4}$ ton, 4 x 4 truck).....	41-P-1564-250
Puller, plate, axle drive pinion bearing (1½ ton, 6 x 6 truck).....	41-P-1527
Puller, spring bolt.....	41-P-2951-70

SPECIAL TOOLS

Description	Federal Stock Number
Puller, steering gear arm.....	41-P-2952
Puller, steering wheel.....	41-P-2954
Puller, transmission reverse idler shaft.....	41-P-2956-50
Puller, universal, bearing.....	41-P-2905-60
Puller, universal, 3 jaw, slide hammer.....	41-P-2957
Remover, universal, oil seal.....	41-R-2378-150
Replacer, oil seal—axle drive pinion bearing, trans- mission, transfer case, pillow block.....	41-R-2395-40
Spacer, transfer case idler shaft bearing (1½ ton, 6 x 6 truck).....	41-S-3868-500
Sleeve, transfer case drive gear bearing (1½ ton, 6 x 6 truck).....	41-S-3776-40
Tubes, hydraulic brake bleeder, with wrenches....	41-T-4170
Tool, removing and installing, brake shoe anchor bolt lock washer.....	41-T-2076-25
Tool, removing, universal joint bearing bushing...	41-T-3271
Tool, valve installing, shock absorber.....	41-T-3381-25
Wrench, differential case cap.....	41-W-3724-100
Wrench, propeller shaft companion flange.....	41-W-1978-950
Wrench, differential drive pinion shaft bearing cup nut and differential bearing adjuster.....	41-W-3724-130
Wrench, torque indicating, foot-pounds.....	41-W-3630
Wrench, torque indicating, inch-pounds.....	41-W-3629-50

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REFERENCES

STANDARD NOMENCLATURE LISTS.

Truck, $\frac{3}{4}$ -ton, 4 x 4, 1942-43 (Dodge T214).....	SNL G-502
Truck, 1¼-ton, 6 x 6 personnel and cargo, 1943 (Dodge T223).....	SNL G-507
Cleaning, preserving and lubrication materials, recoil fluids, special oils, and miscellaneous re- lated items.....	SNL K-1
Soldering, brazing, and welding materials, gases and related items.....	SNL K-2
Tools, maintenance for repair of automotive vehicles	SNL G-27
Tool-sets, motor transport.....	SNL N-19
Tool-sets for ordnance service command, auto- motive shops.....	SNL N-30
Current Standard Nomenclature Lists are listed above. An up-to-date list of SNL's is main- tained in the Index to Ordnance Publications..	OFSB 1-1

EXPLANATORY PUBLICATIONS.

Military motor vehicles.....	AR 850-15
List of publications for training.....	FM 21-6
1½-ton truck, 6 x 6 (Dodge).....	TM 9-810
$\frac{3}{4}$ -ton truck, 4 x 4 (Dodge).....	TM 9-808
Ordnance maintenance: Power plant, clutch, and electrical systems for basic vehicles, $\frac{3}{4}$ -ton, 4 x 4, and 1½-ton, 6 x 6 (Dodge).....	TM 9-1808A
Ordnance maintenance: Hydraulic brake system (Wagner).....	TM 9-1827C

Automotive Materiel.

Automotive electricity.....	TM 10-580
Electric fundamentals.....	TM 1-455
The motor vehicle.....	TM 10-510

Care and Preservation.

Automotive lubrication.....	TM 10-540
Cleaning, preserving, lubricating, and welding materials and similar items issued by Ordnance Department.....	TM 9-850
Explosives and demolitions.....	FM 5-25
Motor vehicle inspection and preventive main- tenance.....	TM 9-2810
Camouflage.....	FM 5-20
Product guide.....	OFSB 6-2

REFERENCES

Decontamination.

Chemical decontamination materials and equipment.....	TM 3-220
Decontamination of armored force vehicles.....	FM 17-59
Defense against chemical attack.....	FM 21-40
Military chemistry and chemical agents.....	TM 3-125

Maintenance and Repair.

Automotive power transmission units.....	TM 10-585
Sheet metal work, body, fender, and radiator repair.....	TM 10-450

Storage and Shipment.

Registration of motor vehicles.....	AR 850-10
Rules governing the loading of mechanized and motorized army equipment, also major caliber guns, for the United States Army and Navy, on open top equipment published by Operations and Maintenance Department of Association of American Railroads.	
Storage of motor vehicle equipment.....	AR 850-18
Ordnance field service storage and shipment chart—group G major items.....	OSSC-G

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[A.G. 300.7 (6 Aug. 43)]

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(For explanation of symbols, see FM 21-6)

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